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ABSTRACT

This report of the Department of Health, Education, and Welfare to the Congress concerns the nutrition of people living in 10 states, from 1968-70. The data presented in this booklet present the preliminary findings for New York City and New York State. The data represent selected characteristics and findings in the population groups that were studied. The intent of the surveys was to determine the nutrition levels of disadvantaged families rather than provide a true picture of a cross section of the total population. Sampling selection was based on 1970 census data, although the actual survey was instituted in June 1968 and not concluded until May 1970. Because of the incomplete nature of the data forming the basis of this report, it is considered that one should be cautious in drawing conclusions. Characteristics of the population sampled (education, age, income, ethnic group) and biochemistries as well as anthropometry (height and weight) and diet are the kinds of information presented. (Author/JW)

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TEN-STATE NUTRITION SURVEY IN THE UNITED STATES, 1968-1970

Preliminary Report to the Congress
April 1971

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I. INTRODUCTION

The data on which this report is based were collected between 1968 and 1970.

The following tables present the preliminary findings from this Ten-State Nutrition Survey. The data represent selected characteristics and findings in the population groups that were studied. The intent of the surveys was to determine the nutrition levels of disadvantaged families rather than provide a true picture of a cross section of the total population. Sampling selection was based on 1960 census data although the actual survey was instituted in June 1968 and not concluded until May 1970.

Editing of the data is continuing at the Center for Disease Control and, upon completion of the data edit and analysis, a final report will be presented to this Committee. Because of the incomplete nature of the data forming the basis of this report, one should be cautious in drawing conclusions. It must also be emphasized that the judgments for interpretation of biochemical measurements presented are based on guidelines establishing "deficient" and "low" levels. While these are widely used standards, there is not a precise relationship between these evidences of malnutrition and occurrence of clinical abnormalities.

II. CHARACTERISTICS OF SAMPLE POPULATION

The numbers of households and individuals providing the basis of this report are presented in Table 1. Though these households and individuals do not represent all those who will be included in the final edited report, it is clear that there were sufficient losses of households and individuals in all localities so that the data to be presented in the later tables should not be extrapolated to other segments of the population.

Four out of the many biochemical variables that were studied were selected for inclusion in this report. A summary of the numbers of these test results available for each survey is shown in Table 2.

The individuals who were examined on each survey did not differ substantially from those who refused examination or who were not available for examination. Tables 3-6 present a comparison of selected demographic characteristics of the examined and non-examined individuals in each survey. Insofar as differences are present which suggest a bias in the interpretation of the final data, we plan to make further detailed tabulations to investigate the degree of this bias. Examples of these problem areas are seen in the over 60 age group in California where there were twice as many individuals over 60 in the not examined group, as compared to the examined group. In South Carolina there were three times as many white individuals in the not examined group (Table 5) as compared to the examined group. This is also seen when one looks at the percentage of individuals examined who were below the poverty level in the various states. Comparison of individuals at similar economic levels may be made between the states though there is little justification for making overall comparisons between the various surveys as the average economic status of the individuals in the different surveys differ considerably (Table 7). The indication of the economic status used in these surveys is the Poverty-Index Ratio (Orshansky Index). This is a composite index based on income, family size, farm or non-farm, and sex and age of head of household. For purposes of this report the poverty line is set at a Poverty-Index Ratio of 1.00.

Table 1. Participation of Households and Individuals in Nutrition Surveys by State and New York City, 1968-1970 (Preliminary)

State	Total Number of Households in Sample	Total Number of Households Interviewed	Percent of Households Interviewed	Number of Households with Members Attending Clinic	Percent of Interviewed Households with Members Attending Clinic	Total Number of Individuals in Interviewed Households	Number of Individuals from Interviewed Households Attending Clinic	Percent Attending Clinic of Total Individuals in Interviewed Households
Total	29612	23192	78	12649	55	83597	38501	46
Texas	1990	1782	90	1188	67	7806	4215	54
Louisiana	1920	1616	84	940	58	5053	3783	75
New York State	2866	2107	74	1125	53	6979	3147	45
Kentucky	1594	1108	70	594	54	4004	1662	42
Michigan	1867	1645	88	777	47	6375	2321	36
New York City	1382	1381	100 [1]	681	49	4883	1889	39
West Virginia	1802	1793	99 [1]	588	33	5630	1628	29
California	5747	3904	68	2069	53	13217	5840	44
Washington	4363	2888	66	2043	71	9263	5312	57
South Carolina	3121	2055	66	1120	55	9756	4650	48
Massachusetts	2960	2913	98 [1]	1524	52	10631	4054	38

[1] Percentages unrealistically high due to incomplete editing of data on computer tapes.

Table 2. Number of Individuals Tested for Selected Biochemicals in Nutrition Surveys by State and New York City, 1968-1970 (Preliminary)

State	Selected Biochemicals				
	Hemoglobin	Plasma Vitamin A	Serum Vitamin C	Urinary Riboflavin	Tested for Two or More of These Four Selected Biochemicals
Total	32669	22261	21766	21311	18590
Texas	3304	2997	2539	3022	N.A.
Louisiana	4545	3898	3970	838	N.A.
New York State	2811	1055	992	1138	1155
Kentucky	1261	1040	1204	1166	1297
Michigan	1917	894	860	933	948
New York City	1860	1073	1069	1164	1192
West Virginia	1293	641	618	684	683
California	4783	3712	3225	4373	4551
Washington	3771	2426	3153	3543	3860
South Carolina	3727	2143	1891	2062	2309
Massachusetts	3397	2382	2245	2388	2595

N.A.—Not Available.

Table 3. Comparison of Education of Persons 21 Yrs. of Age and Over for Households that Were Examined with Households that Were Not Examined in Nutrition Surveys by State and New York City, 1968-1970 (Preliminary)

State	Total Number Individuals	Education of Persons 21 and Over (Percent)						
		None	4th Grade or Less	5th thru 8th Grade	9th thru 12th Grade	Post High School	College	Other
N.Y. (Up-State)								
Examined	2047	0.7	3.3	24.8	52.8	4.2	13.7	0.2
Not Exam.	1765	0.7	2.8	27.0	55.2	3.5	10.0	0.5
Kentucky								
Examined	1042	2.5	15.6	46.1	28.8	1.0	5.1	0.4
Not Exam.	873	2.7	12.4	46.7	30.5	1.1	5.7	0.5
Michigan								
Examined	1344	0.7	4.7	24.7	53.6	3.1	12.9	0.0
Not Exam.	1570	1.2	4.3	24.4	58.0	2.1	9.4	0.3
N.Y. City								
Examined	1139	4.0	9.9	26.5	43.7	2.5	12.6	0.6
Not Exam.	1176	3.9	6.7	25.6	49.6	2.3	11.3	0.2
W. Virginia								
Examined	1184	1.6	6.1	37.8	38.5	1.8	13.6	0.5
Not Exam.	1582	1.7	6.1	37.4	44.3	2.1	8.4	0.1
California								
Examined	3531	3.5	10.9	21.2	41.7	2.9	19.4	0.0
Not Exam.	3403	2.2	7.9	21.2	49.0	2.8	15.6	0.9
Washington								
Examined	3172	1.0	1.9	18.6	51.9	4.0	22.3	0.0
Not Exam.	1079	0.9	2.6	20.3	55.0	4.8	16.1	0.0
South Carolina								
Examined	2138	4.7	20.2	36.9	35.8	0.5	1.6	0.0
Not Exam.	1822	5.7	16.6	34.7	36.8	0.7	4.8	0.3
Massachusetts								
Examined	2612	3.9	6.6	20.1	49.5	3.8	15.3	0.4
Not Exam.	2458	2.5	4.5	21.1	53.2	4.3	13.7	0.2

NOTE: The designation EXAMINED reflects all persons in households with any clinic participation, though some individuals within these households did not attend clinic and were not examined. Also the totals in this table are below the totals in table 1 due to the loss of some individuals in the process of editing for discrepancies.

Table 4. Comparison of Persons by Age Group Breakdowns for Households that Were Examined with Households that Were Not Examined in Nutrition Surveys by State and New York City, 1968–1970 (Preliminary)

State	Total Number Individuals	Age Groups (Percent)						
		<6	6-9	10-16	17-49	50-59	60+	Unk.
N.Y. (Up-State)								
Examined	3886	12.9	10.7	16.3	38.6	9.3	12.0	0.1
Not Exam.	3091	12.3	9.3	12.8	38.3	9.9	16.9	1.5
Kentucky								
Examined	2196	14.0	11.1	18.8	33.0	9.2	13.3	0.6
Not Exam.	1758	12.5	9.3	15.2	37.7	9.1	13.8	2.4
Michigan								
Examined	3118	13.9	13.3	21.8	34.7	6.0	10.2	0.1
Not Exam.	3222	16.1	10.2	16.4	37.9	7.9	10.9	0.5
N.Y. City								
Examined	2465	15.3	11.4	18.7	40.3	7.3	6.3	0.7
Not Exam.	2408	15.7	10.8	15.6	41.7	6.1	7.7	2.3
W. Virginia								
Examined	2263	11.4	9.9	19.1	37.1	9.1	13.4	—
Not Exam.	2888	11.9	8.9	16.4	41.1	8.2	13.4	—
California								
Examined	7592	15.1	11.9	17.8	38.4	6.7	10.1	—
Not Exam.	5617	11.6	7.0	11.3	41.6	7.9	20.6	0.0
Washington								
Examined	6615	14.4	11.8	16.7	38.8	6.1	11.0	1.1
Not Exam.	2548	13.2	8.4	12.9	42.9	6.9	12.6	3.1
South Carolina								
Examined	5939	17.7	13.2	23.9	30.3	6.5	7.7	0.6
Not Exam.	3764	13.0	8.8	16.8	35.7	8.1	12.3	5.4
Massachusetts								
Examined	5815	14.5	12.9	18.9	39.8	6.2	7.3	0.4
Not Exam.	4586	13.3	8.6	14.0	43.1	8.3	11.4	1.2

NOTE: The designation EXAMINED reflects all persons in households with any clinic participation, though some individuals within these households did not attend clinic and were not examined. Also the totals in this table are below the totals in table 1 due to the loss of some individuals in the process of editing for discrepancies.

Table 5. Comparison of Persons in Ethnic Groups for Households that Were Examined with Households that Were Not Examined in Nutrition Surveys by State and New York City, 1968-1970 (Preliminary)

State	Total Number Individuals	Ethnic Groups (Percent)					
		White*	Negro	Spanish American	Oriental	American Indian	Unknown
N.Y. (Up-State)							
Examined	3886	79.2	17.9	1.8	0.1	0.5	0.5
Not Exam.	3091	78.7	19.0	1.4	0.2	0.6	0.1
Kentucky							
Examined	2196	75.0	23.0	—	0.0	—	2.0
Not Exam.	1758	78.4	15.5	—	—	—	6.1
Michigan							
Examined	3118	49.8	49.0	0.4	—	0.5	0.3
Not Exam.	3222	50.3	46.8	0.3	0.2	1.8	0.6
N.Y. City							
Examined	2465	12.9	42.1	35.1	2.1	—	7.7
Not Exam.	2408	15.0	43.5	35.3	1.5	0.0	4.7
W. Virginia							
Examined	2263	88.5	11.2	0.0	0.3	—	—
Not Exam.	2888	90.4	9.5	—	—	0.1	—
California							
Examined	7592	39.1	16.5	36.5	5.4	1.8	0.6
Not Exam.	5617	48.3	20.7	25.7	4.1	0.3	0.8
Washington							
Examined	6615	80.4	3.7	1.8	1.7	10.1	2.3
Not Exam.	2548	76.3	8.5	0.9	0.9	8.7	4.6
South Carolina							
Examined	5939	4.8	94.7	—	—	0.3	0.2
Not Exam.	3764	13.0	86.2	—	0.1	0.1	0.5
Massachusetts							
Examined	5815	79.2	14.3	4.5	0.5	—	1.5
Not Exam.	4586	83.6	12.6	2.8	0.2	—	0.8

*Excluding Spanish American White.

NOTE: The designation EXAMINED reflects all persons in households with any clinic participation, though some individuals within these households did not attend clinic and were not examined. Also the totals in this table are below the totals in table 1 due to the loss of some individuals in the process of editing for discrepancies.

Table 6. Comparison of Persons in Income Groups for Households that Were Examined with Households that Were Not Examined in Nutrition Surveys by State and New York City, 1968-1970 (Preliminary)

State	Total Number Households	Income Groups (Percent)						
		$0-1999	2000-3999	4000-5999	6000-7999	8000-9999	10,000-11,999	12,000+
N.Y. (Up-State)								
Examined	1027	12.7	18.0	17.7	16.6	13.4	8.5	13.1
Not Exam.	11	Insufficient number to compare						
Kentucky								
Examined	513	35.9	34.7	13.1	9.7	4.1	1.0	1.6
Not Exam.	7	Insufficient number to compare						
Michigan								
Examined	631	18.4	18.9	19.3	15.7	10.1	7.6	10.0
Not Exam.	707	17.0	20.4	15.0	20.1	13.2	6.8	7.6
N.Y. City								
Examined	609	15.8	29.1	29.7	15.3	5.9	1.8	2.5
Not Exam.	574	13.6	30.8	27.7	15.0	6.3	2.8	3.8
W. Virginia								
Examined	493	30.0	25.8	16.2	15.0	7.5	1.6	3.9
Not Exam.	146	37.0	28.1	18.5	8.2	4.8	2.1	1.4
California								
Examined	1742	12.6	26.3	21.2	16.5	8.9	5.2	9.2
Not Exam.	428	17.1	26.4	15.7	16.4	8.9	5.4	10.3
Washington								
Examined	1718	25.3	17.0	13.1	15.1	11.4	7.9	10.2
Not Exam.	99	30.3	16.2	14.1	5.1	10.1	10.1	14.1
South Carolina								
Examined	1035	45.7	34.7	14.1	2.7	2.1	0.5	0.2
Not Exam.	41	Insufficient number to compare						
Massachusetts								
Examined	1404	12.3	19.4	18.7	18.2	12.5	8.0	10.9
Not Exam.	207	32.9	22.2	14.0	14.5	5.8	4.3	6.3

NOTE: The designation EXAMINED reflects all persons in households with any clinic participation, though some individuals within these households did not attend clinic and were not examined. Also the totals in this table are below the totals in table 1 due to the loss of some individuals in the process of editing for discrepancies.

Table 7. Mean Poverty Index Ratio and Distribution of Persons Below and Above the Poverty Level for Ten States and New York City Nutrition Surveys, 1968-1970 (Preliminary)

State	Total Individuals with Known PIR	Mean PIR	Standard Deviation from Mean PIR	Poverty Income Ratio			
				Below Poverty		Above Poverty	
				Number	Percent	Number	Percent
Texas	965	1.1	0.7	587	60.8	378	39.2
Louisiana	659	1.4	N.A.	306	46.4	353	53.6
New York State	1044	1.9	0.8	188	18.0	856	82.0
Kentucky	554	1.2	1.2	320	57.8	234	42.2
Michigan	1433	1.8	1.5	463	32.4	970	67.6
New York City	1182	1.6	0.8	333	28.2	849	71.8
West Virginia	607	1.4	0.9	261	43.0	346	57.0
California	2148	1.9	0.9	446	20.8	702	79.2
Washington	1645	1.8	0.9	440	26.8	1205	73.2
South Carolina	1057	0.8	0.6	800	75.7	257	24.3
Massachusetts	1537	1.9	0.9	325	21.1	1212	78.9

N.A.—Not Available.

III. BIOCHEMISTRY

A. HEMOGLOBIN

The measurement of the amount of hemoglobin in blood is one way of assessing the status of iron nutriture in individuals. The data regarding hemoglobin levels in the populations surveyed are presented in Tables 8A–8E. The levels of hemoglobin used in determining deficient and low levels are presented in Table 8A. The cutoff level for "deficient" is set in such a way that most authorities would accept these values as abnormal; the cutoff level for "low" is open to more variation in interpretation and generally represents a borderline situation.

It is clear from Tables 8A and 8B that in all areas individuals living below the poverty level have greater problems of iron nutriture than individuals living above the poverty level. Again, one should be very careful, however, in comparing percentages from state to state because of the widely different percentage of individuals examined who are in the poverty group.

In Table 8C the data suggest that males as a group have a higher % of deficiency than females. These differences may be due to the use of inappropriate standards for males and will be revised if further consultation and investigation reveal the need for such a revision.

It is evident from Table 8D that the group at greatest risk for having a high prevalence of probable iron-deficiency anemia are children under the age of 6. It is also clear from these data that the elderly segment of the populations studied are also at high risk in this regard.

In all states the minority groups in the populations surveyed have a substantially higher prevalence of abnormal hemoglobin levels than the white populations.

A review of these data on hemoglobin levels suggests that possible iron-deficiency anemia is a major problem in most segments of the populations surveyed. Any measures designed to alleviate this problem should be directed at all segments of our population with emphasis on the poor, the minority groups among us, children, and elderly individuals. Figures 1a—1f graphically portray the findings presented in Tables 8A—8E.

Table 8A. Comparison of Number, Percent Deficient, and Percent Deficient and/or Low Between Persons Below Poverty with Persons Above Poverty for Selected Biochemical by Ten States and New York City Nutrition Surveys, 1968-1970 (Preliminary)

State	HEMOGLOBIN					
	Below Poverty			Above Poverty		
	Number	% Deficient [1]	% Deficient and Low	Number	% Deficient [1]	% Deficient and Low
Total	10629	5.0	25.1	14647	1.5	12.6
Texas	1777	N.A.	20.4	921	N.A.	15.8
Louisiana	1202	N.A.	38.9	675	N.A.	29.5
New York State	442	2.7	15.4	2064	1.2	9.3
Kentucky	681	4.7	21.1	477	2.5	15.5
Michigan	478	3.1	20.7	1142	1.3	15.7
New York City	567	4.2	19.9	1061	2.1	15.9
West Virginia	480	1.5	14.4	616	1.4	10.3
California	1107	1.7	11.5	2954	1.2	9.4
Washington	379	1.3	13.5	1320	0.7	7.5
South Carolina	2868	8.8	38.3	705	5.7	31.1
Massachusetts	648	2.6	11.1	2712	1.1	8.3

N.A.—Not Available.
[1] Texas and Louisiana excluded.

Hemoglobin Deficient and Low Standards (gm/100 ml)

	Deficient	Low	Acceptable
6-23 months	<9.0	9.0-9.9	≥10.0
2-5 years	<10.0	10.0-10.9	≥11.0
6-12 years	<10.0	10.0-11.4	≥11.5
13-16 male	<12.0	12.0-12.9	≥13.0
13-16 female	<10.0	10.0-11.4	≥11.5
>16 male	<12.0	12.0-13.9	≥14.0
>16 female	<10.0	10.0-11.9	≥12.0
Pregnant, 3rd. Trimester	<9.5	9.5-10.9	≥11.0

Table 8B. Comparison of Number, Percent Deficient, and Percent Deficient and/or Low Between Poverty Income Ratio Groups for Selected Biochemical by Ten States and New York City Nutrition Surveys, 1968-1970 (Preliminary)

HEMOGLOBIN

State	Poverty Income Ratio														
	<1.00			1.00-1.49			1.50-1.99			2.00-2.49 [1]			2.50 and Over		
	Number	% Deficient [2]	% Deficient and Low	Number	% Deficient [2]	% Deficient and Low	Number	% Deficient [2]	% Deficient and Low	Number	% Deficient [2]	% Deficient and Low	Number	% Deficient [2]	% Deficient and Low
Total	10629	5.0	25.1	4815	2.6	15.3	2997	1.0	12.5	2737	1.4	13.7	4098	0.8	8.9
Texas	1777	N.A.	20.4	476	N.A.	16.2	230	N.A.	17.8	215	N.A.	12.6	N.A.	N.A.	N.A.
Louisiana	1202	N.A.	38.9	62	N.A.	33.9	123	N.A.	39.0	490	N.A.	26.5	N.A.	N.A.	N.A.
New York State	442	2.7	15.4	418	2.2	12.7	364	0.5	9.3	353	1.1	9.9	929	1.0	7.5
Kentucky	681	4.7	21.1	224	2.2	18.3	97	4.1	15.4	55	1.8	12.7	101	2.0	10.9
Michigan	478	3.1	20.7	341	2.3	18.7	265	0.0	12.8	207	2.4	19.8	329	0.6	12.5
New York City	567	4.2	19.9	590	2.2	17.7	220	0.9	14.1	103	3.9	19.4	148	2.0	8.8
West Virginia	480	1.5	14.4	255	1.3	8.0	130	1.5	10.7	102	1.0	5.9	129	1.6	17.9
California	1107	1.7	11.5	955	2.4	10.1	627	0.8	8.5	408	1.0	10.6	964	0.5	8.8
Washington	379	1.3	13.5	262	1.1	11.4	319	0.3	6.6	208	1.0	6.8	531	0.6	6.4
South Carolina	2868	8.8	38.3	456	6.4	35.1	145	3.4	28.2	61	9.8	26.2	43	0.0	27.9
Massachusetts	648	2.6	11.1	776	2.1	8.9	477	1.1	8.7	535	0.4	6.9	924	0.7	8.4

N.A.—Not Available.
[1] Interpret as 2.00 and over for Texas and Louisiana.
[2] Texas and Louisiana excluded.

Hemoglobin Deficient and Low Standards (gm/100 ml)

	Deficient	Low	Acceptable
6-23 months	<9.0	9.0-9.9	≥10.0
2-5 years	<10.0	10.0-10.9	≥11.0
6-12 years	<10.0	10.0-11.4	≥11.5
13-16 male	<12.0	12.0-12.9	≥13.0
13-16 female	<10.0	10.0-11.4	≥11.5
>16 male	<12.0	12.0-13.9	≥14.0
>16 female	<10.0	10.0-11.9	≥12.0
Pregnant, 3rd. Trimester	<9.5	9.5-10.9	≥11.0

Table 8C. Comparison of Number, Percent Deficient, and Percent Deficient and/or Low Between Sexes for Selected Biochemical by Ten States and New York City Nutrition Surveys, 1968-1970 (Preliminary)

HEMOGLOBIN

State	Male			Female		
	Number	% Deficient [1]	% Deficient and Low	Number	% Deficient [1]	% Deficient and Low
Total	13159	3.5	22.0	17423	2.2	16.9
Texas	1371	N.A.	21.2	1880	N.A.	17.6
Louisiana	1806	N.A.	42.0	2539	N.A.	35.7
New York State	1277	2.3	12.8	1446	0.9	8.0
Kentucky	568	5.6	23.2	688	2.3	15.6
Michigan	797	2.9	21.6	1099	1.2	16.4
New York City	780	2.8	17.2	1086	2.3	16.9
West Virginia	540	2.0	16.9	752	0.9	9.6
California	1986	2.0	11.7	2711	1.3	9.2
Washington	900	0.7	10.4	1097	0.8	7.8
South Carolina	1550	9.9	42.8	2183	6.8	33.0
Massachusetts	1584	1.8	10.7	1942	0.9	7.8

N.A.—Not Available.
[1] Excludes Texas and Louisiana.

Hemoglobin Deficient and Low Standards (gm/100 ml)

	Deficient	Low	Acceptable
6-23 months	<9.0	9.0-9.9	≥10.0
2-5 years	<10.0	10.0-10.9	≥11.0
6-12 years	<10.0	10.0-11.4	≥11.5
13-16 male	<12.0	12.0-12.9	≥13.0
13-16 female	<10.0	10.0-11.4	≥11.5
>16 male	<12.0	12.0-13.9	≥14.0
>16 female	<10.0	10.0-11.9	≥12.0
Pregnant, 3rd. Trimester	<9.5	9.5-10.9	≥11.0

Table 8D. Comparison of Number, Percent Deficient, and Percent Deficient and/or Low Between Age Groups for Selected Biochemical by Eight States and New York City Nutrition Surveys, 1968-1970 (Preliminary)

HEMOGLOBIN

State	Age Groups																	
	<6			6-9			10-16			17-49			50-59			60 Yrs. and Over		
	Number	% Deficient	% Deficient and Low	Number	% Deficient	% Deficient and Low	Number	% Deficient	% Deficient and Low	Number	% Deficient	% Deficient and Low	Number	% Deficient	% Deficient and Low	Number	% Deficient	% Deficient and Low
Total	**2636**	**7.7**	**20.0**	**3288**	**1.3**	**15.5**	**5032**	**2.8**	**14.3**	**8033**	**1.8**	**15.7**	**1745**	**2.0**	**15.3**	**2525**	**2.7**	**18.5**
New York State	302	6.6	20.2	339	0.0	6.5	486	1.6	7.2	1035	0.4	9.8	277	0.7	9.4	366	2.5	13.2
Kentucky	183	9.3	26.2	164	0.0	13.4	239	2.9	13.4	352	2.3	19.6	120	2.5	19.2	197	6.6	22.8
Michigan	115	2.6	10.4	325	0.9	19.4	515	2.9	17.1	582	1.4	19.3	122	0.8	16.4	250	2.8	23.2
New York City	301	6.3	19.9	255	1.2	15.7	388	2.6	13.9	693	1.0	16.9	121	5.0	17.4	124	1.6	21.8
West Virginia	101	1.0	6.9	186	0.5	10.2	254	2.4	9.5	431	1.6	14.6	124	0.8	12.1	200	1.5	18.0
California	565	5.7	14.7	654	0.2	6.5	924	1.4	8.3	1742	0.9	10.4	346	1.4	13.2	553	1.4	12.2
Washington	122	0.0	2.5	275	0.0	3.6	427	0.5	6.8	804	1.2	11.0	161	0.6	9.3	257	1.2	14.8
South Carolina	562	16.5	35.7	592	5.9	44.2	1082	6.6	31.0	1006	6.6	38.4	226	6.6	36.2	280	7.9	42.5
Massachusetts	385	4.4	13.8	498	0.0	6.0	717	1.4	6.3	1388	1.2	10.4	248	0.4	7.7	298	0.0	9.4

Hemoglobin Deficient and Low Standards (gm/100 ml)

	Deficient	Low	Acceptable
6-23 months	<9.0	9.0-9.9	≥10.0
2-5 years	<10.0	10.0-10.9	≥11.0
6-12 years	<10.0	10.0-11.4	≥11.5
13-16 male	<12.0	12.0-12.9	≥13.0
13-16 female	<10.0	10.0-11.4	≥11.5
>16 male	<12.0	12.0-13.9	≥14.0
>16 female	<10.0	10.0-11.9	≥12.0
Pregnant, 3rd. Trimester	<9.5	9.5-10.9	≥11.0

Table 8E. Comparison of Number, Percent Deficient, and Percent Deficient and/or Low Between Ethnic Groups for Selected Biochemical by Ten States and New York City Nutrition Surveys, 1968-1970 (Preliminary)

HEMOGLOBIN

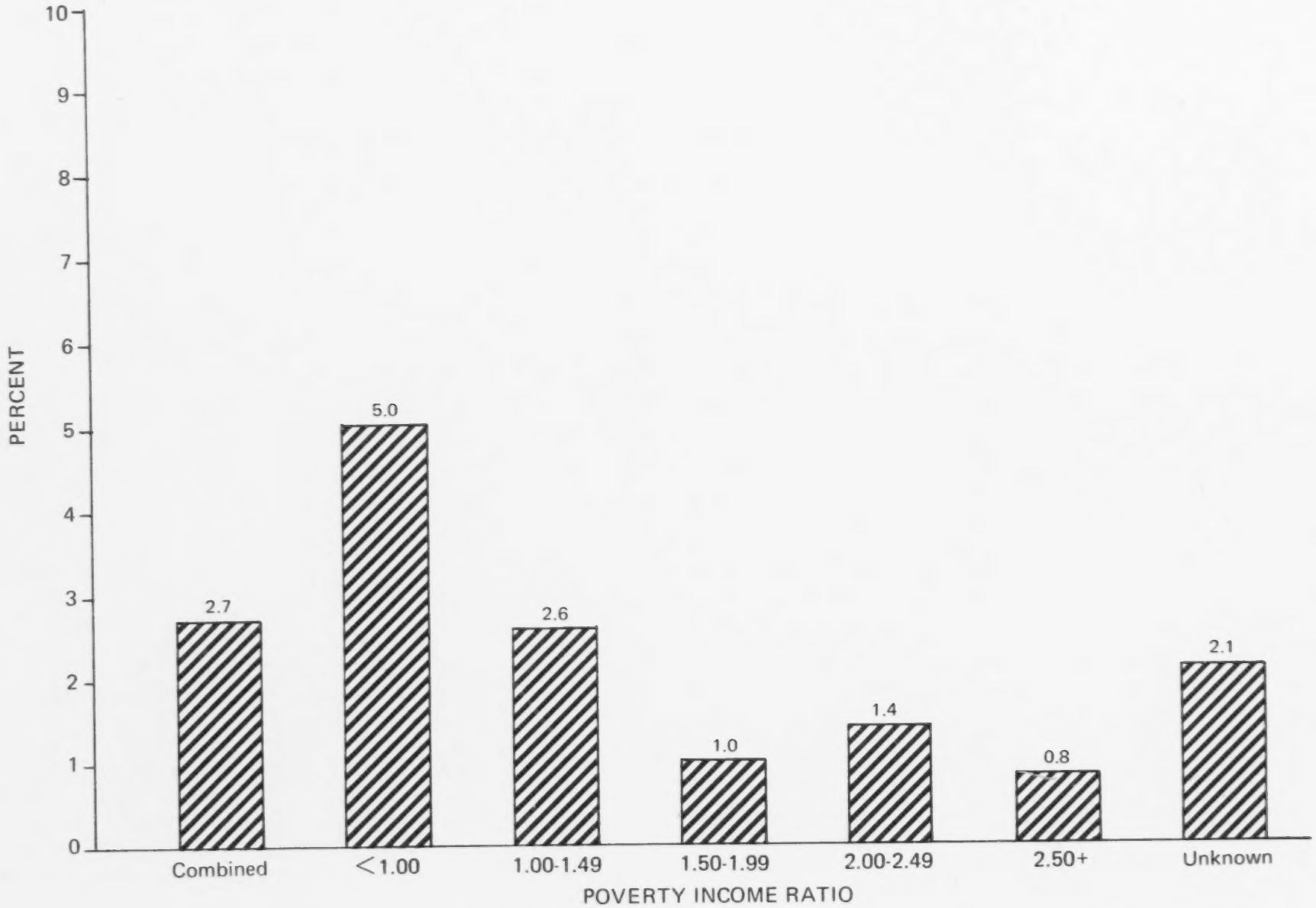
State	White			Negro			Spanish American			Orientals			American Indian		
	Number	% Deficient [1]	% Deficient and Low	Number	% Deficient [1]	% Deficient and Low	Number	% Deficient [2]	% Deficient and Low	Number	% Deficient [1]	% Deficient and Low	Number	% Deficient [1]	% Deficient and Low
Total	14219	1.2	10.9	11491	5.8	32.7	4695	1.6	14.6	298	1.4	10.4	385	1.6	18.2
Texas	364	N.A.	8.8	1185	N.A.	20.8	1702	N.A.	20.2	—	—	—	—	—	—
Louisiana	1386	N.A.	29.9	2959	N.A.	42.3	—	—	—	—	—	—	—	—	—
New York State	2261	1.1	8.0	462	3.7	21.7	62	1.6	16.1	—	—	—	—	—	—
Kentucky	948	3.9	16.6	308	3.6	26.7	—	—	—	—	—	—	—	—	—
Michigan	1008	0.6	8.4	888	3.4	30.1	—	—	—	—	—	—	—	—	—
New York City	235	1.7	9.4	831	3.0	22.9	800	2.3	13.2	19	0.0	10.5	—	—	—
West Virginia	1158	1.2	12.3	134	3.7	15.6	—	—	—	—	—	—	—	—	—
California	2090	1.1	7.8	715	4.1	20.9	1653	1.0	8.6	239	1.3	10.5	87	1.1	17.2
Washington	1638	0.6	6.4	61	0.0	32.8	24	0.0	0.0	27	3.7	14.8	298	1.7	18.5
South Carolina	174	2.9	19.0	3559	8.3	37.9	—	—	—	—	—	—	—	—	—
Massachusetts	2957	1.0	7.2	389	3.1	20.7	180	3.4	15.1	13	0.0	0.0	—	—	—

N.A.—Not Available.
[1] Excludes Texas and Louisiana.
[2] Excludes Texas.

Hemoglobin Deficient and Low Standards (gm/100 ml)

	Deficient	Low	Acceptable
6-23 months	<9.0	9.0-9.9	≥10.0
2-5 years	<10.0	10.0-10.9	≥11.0
6-12 years	<10.0	10.0-11.4	≥11.5
13-16 male	<12.0	12.0-12.9	≥13.0
13-16 female	<10.0	10.0-11.4	≥11.5
>16 male	<12.0	12.0-13.9	≥14.0
>16 female	<10.0	10.0-11.9	≥12.0
Pregnant, 3rd. Trimester	<9.5	9.5-10.9	≥11.0

Figure 1a - Percent of Persons With Deficient Hemoglobin by Poverty Income Ratio in Eight States and New York City Nutrition Surveys, 1968-1970 (Preliminary)



Note: Texas and Louisiana are excluded

Figure 1b - Percent of Persons With Deficient and/or Low Hemoglobin by Poverty Income Ratio in Ten States and New York City Nutrition Surveys, 1968-1970 (Preliminary)

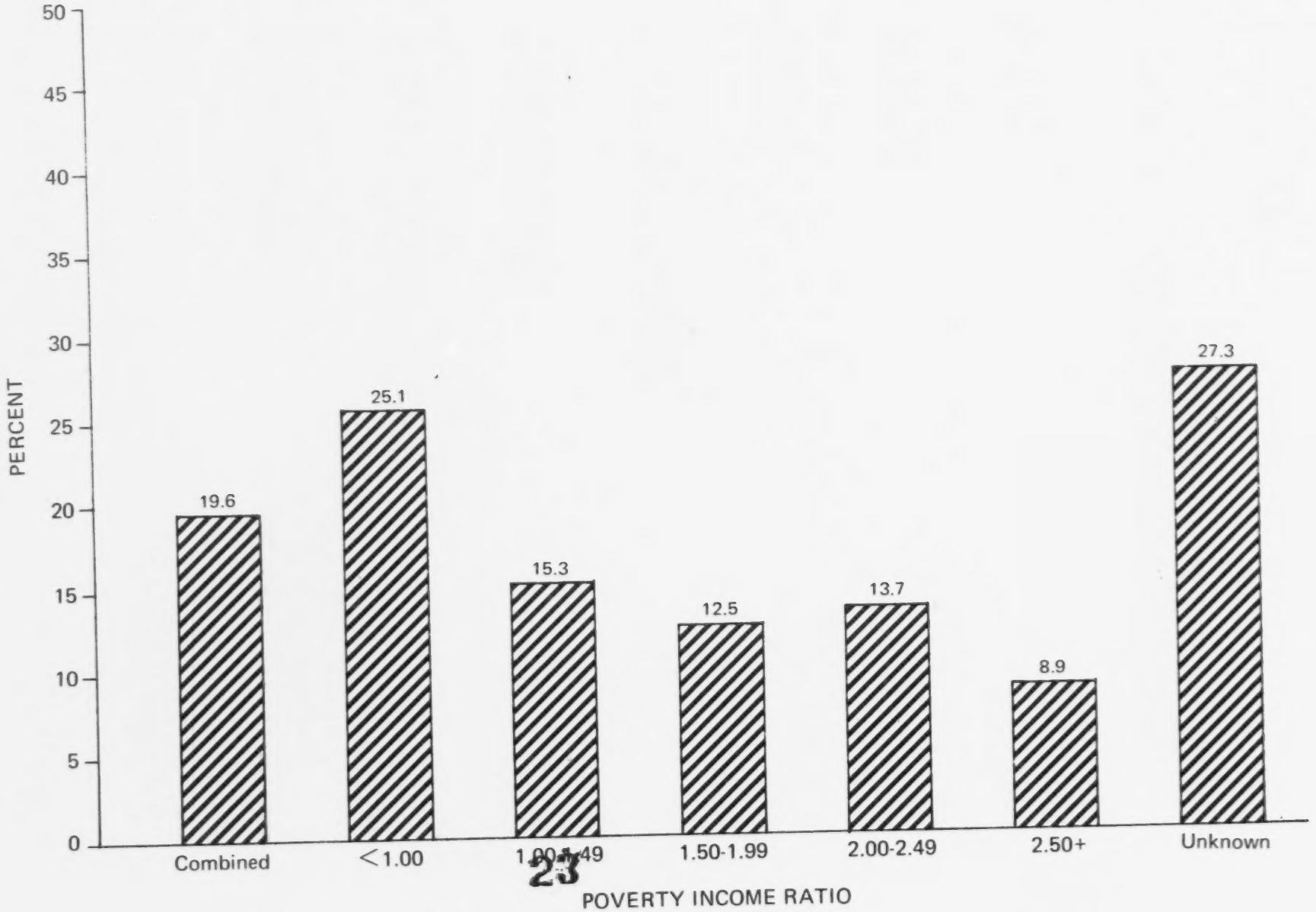


Figure 1c - Percent of Persons in the Below and Above Poverty Groups With Deficient Hemoglobin by Ten States and New York City Nutrition Surveys, 1968-1970 (Preliminary)

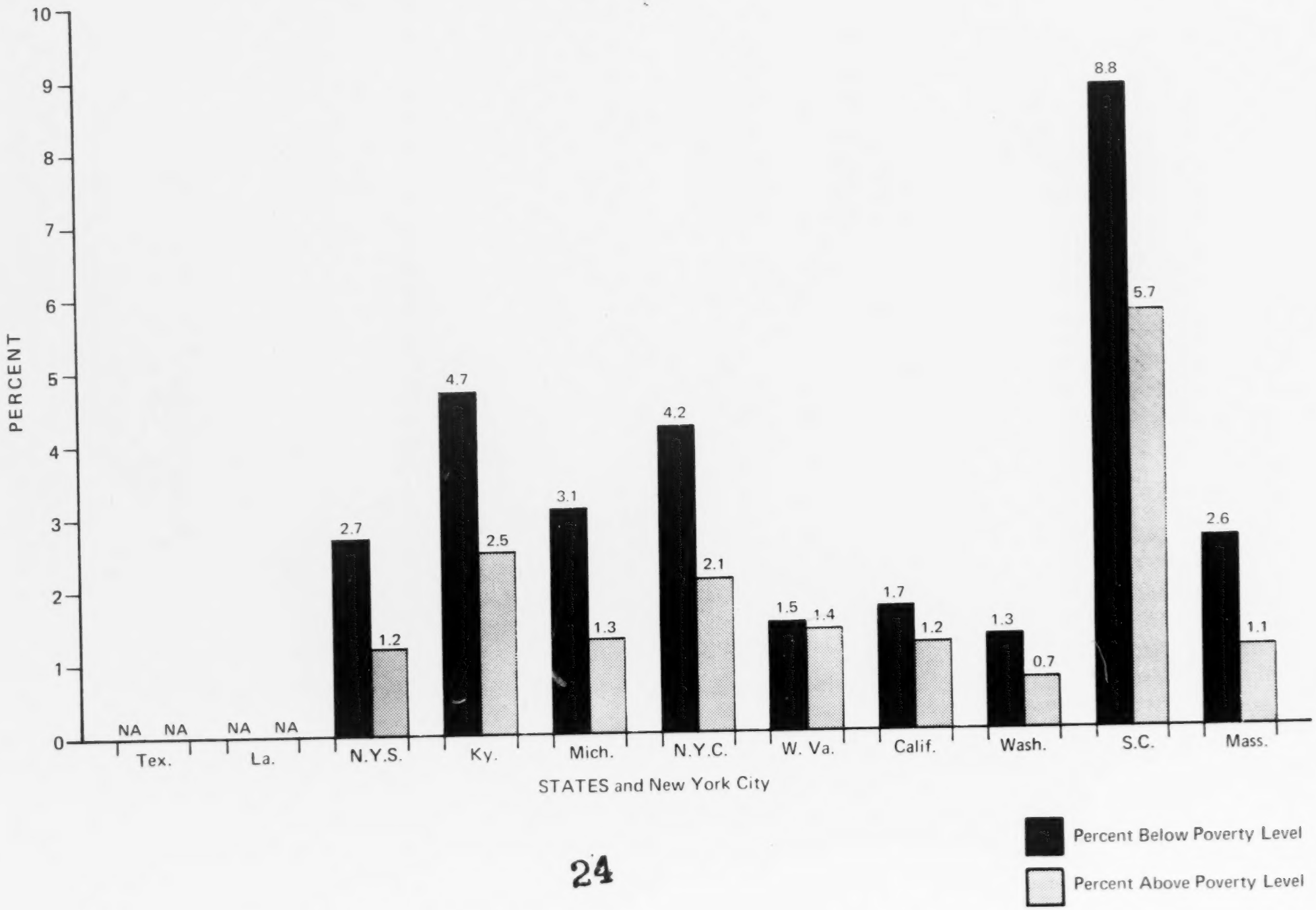


Figure 1d - Percent of Persons in the Below and Above Poverty Groups With Deficient and/or Low Hemoglobin by Ten States and New York City Nutrition Surveys, 1968-1970 (Preliminary)

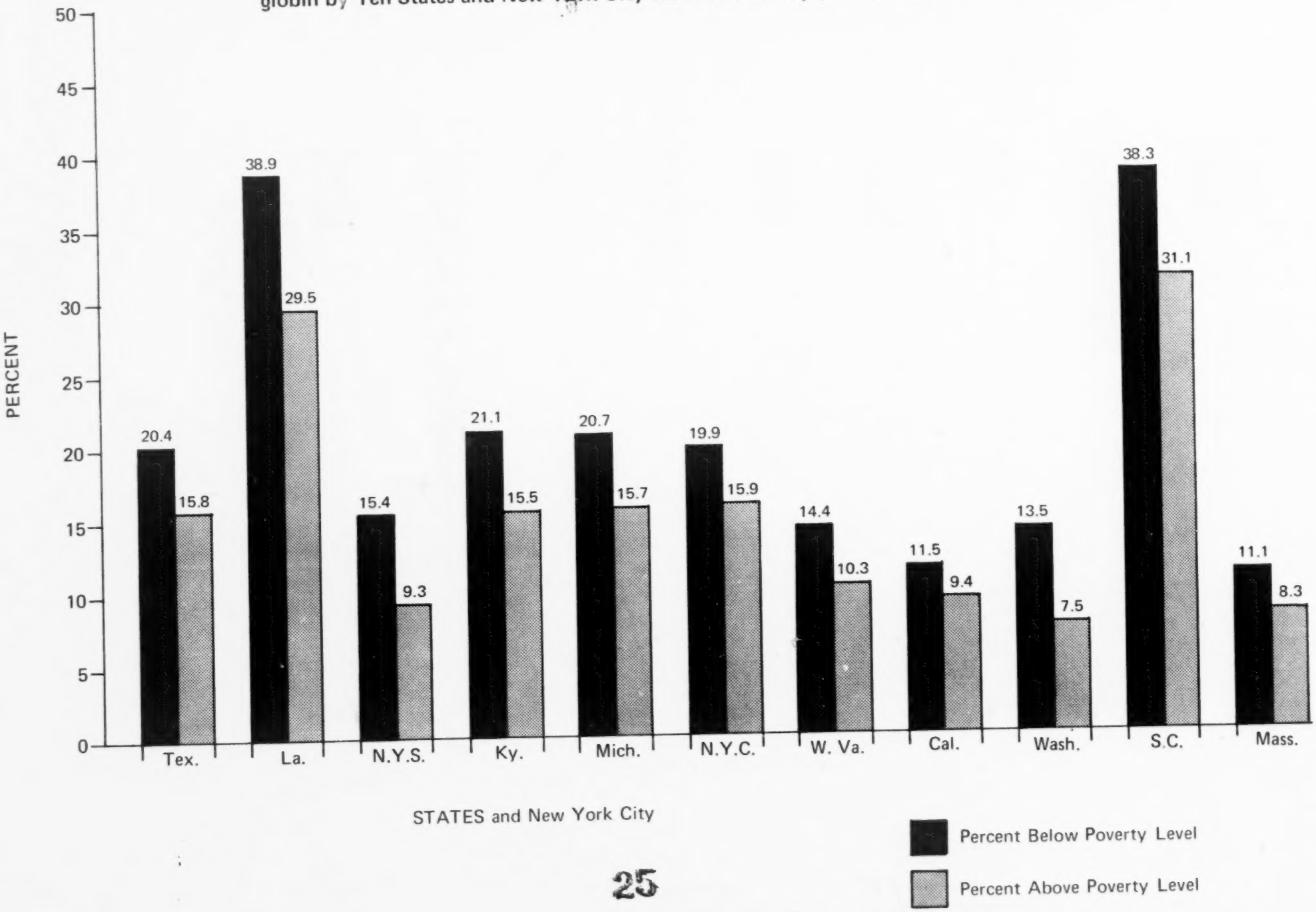


Figure 1e - Percent of Persons With Deficient Hemoglobin by White and Negro Breakdown in Ten States and New York City Nutrition Surveys, 1968-1970 (Preliminary)

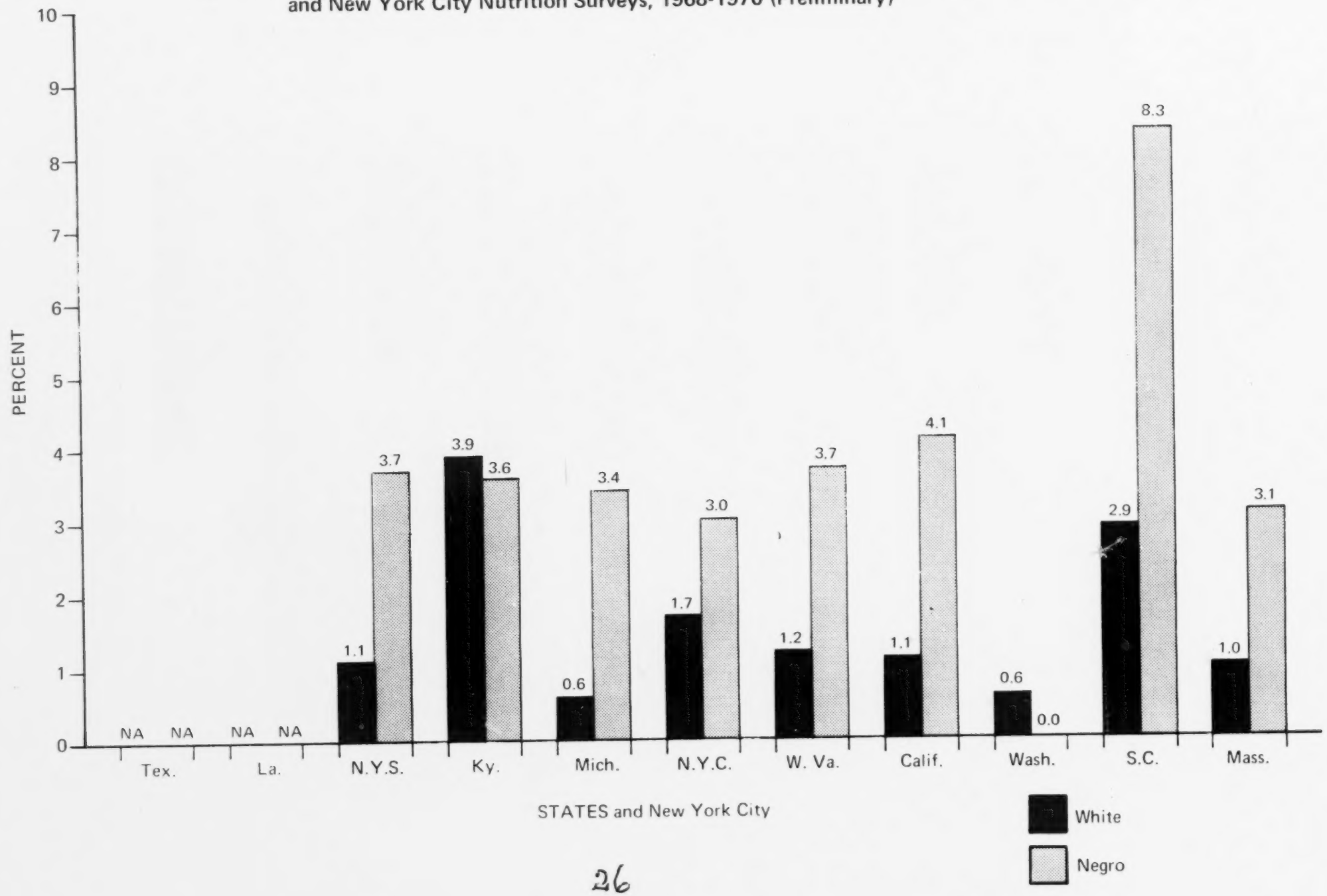


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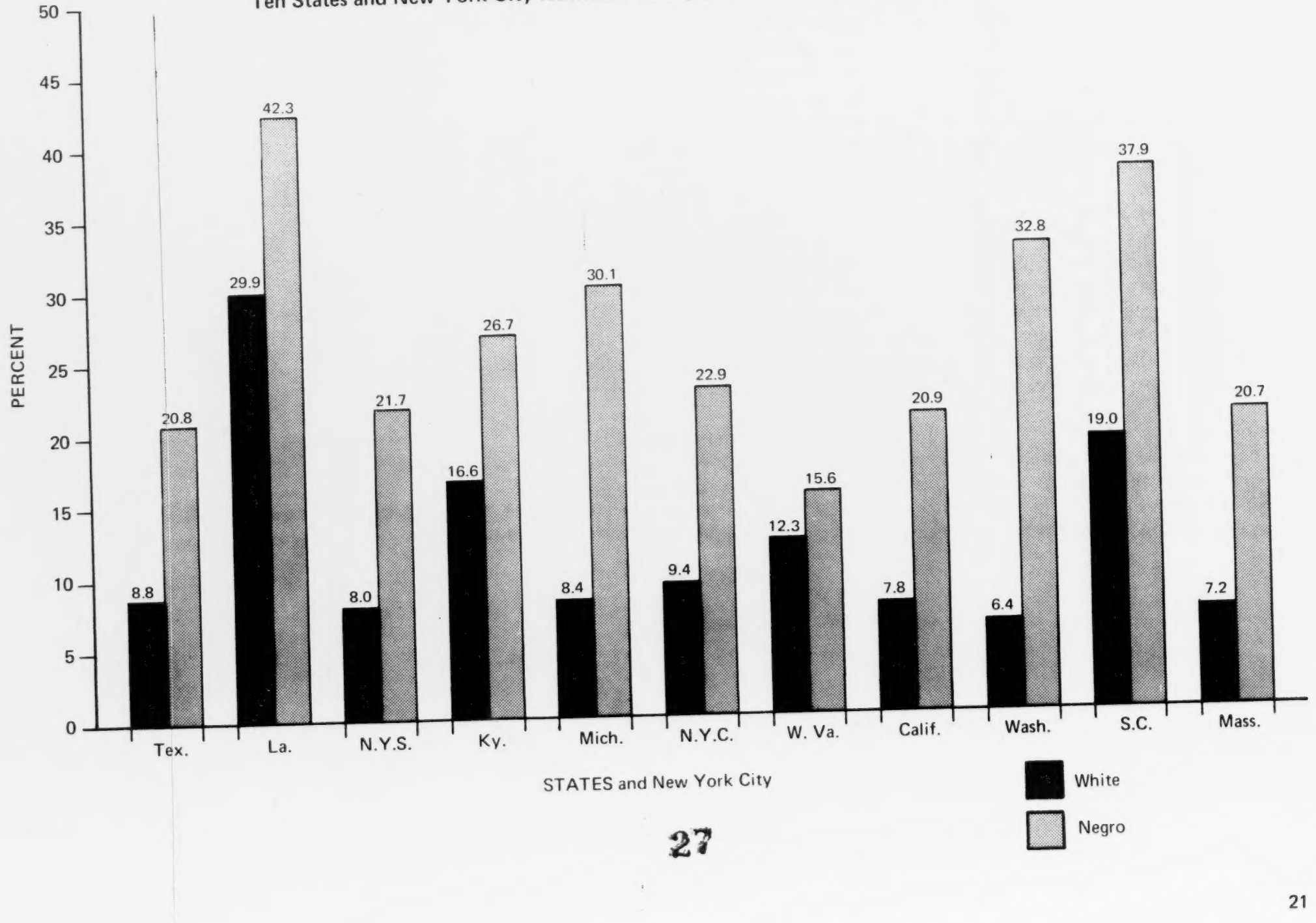
Figure 1f - Percent of Persons With Deficient and/or Low Hemoglobin by White and Negro Breakdown in Ten States and New York City Nutrition Surveys, 1968-1970 (Preliminary)



B. VITAMIN A

The material on plasma vitamin A levels is presented in Tables 9A—9E. In evaluating these data one should bear in mind that the examinations were performed during different seasons in different areas. The inconsistencies that appear between states may relate to seasonal availability of food sources of vitamin A and may not, therefore, represent real deficiencies.

The data for New York State are not presented because of reporting difficulties which will be corrected prior to the preparation of final reports.

A similar relationship between poverty and evidence of possible vitamin A undernutrition is seen as with hemoglobin. These differences are not as clear cut as with hemoglobin and suggest that the relationship between vitamin A nutrition and socio-economic status is not as strong as between iron nutrition and socio-economic status. This fact should be taken into account in the development of program activities directed towards the improvement of vitamin A nutrition.

There does not appear to be any consistent differences in vitamin A levels between males and females (Table 9C). Data in Table 9D show that the problems of vitamin A nutrition are probably greater in children under the age of 10 as compared to individuals over age 10.

It appears from the data in Table 9E that minority groups have more evidence of vitamin A undernutrition than do white.

These data on vitamin A levels suggest the presence of nutritional problems related to vitamin A intake in minority groups and children under the age of 10. There are no data available from the survey at the present time as to the physiological significance of these low vitamin A levels.

Table 9A. Comparison of Number, Percent Deficient and Percent Deficient and/or Low Between Persons Below Poverty with Persons Above Poverty for Selected Biochemical by Seven States and New York City Nutrition Surveys, 1968-1970 (Preliminary)

VITAMIN A

State	Below Poverty			Above Poverty		
	Number	% Deficient	% Deficient and Low	Number	% Deficient	% Deficient and Low
Total	4455	1.5	8.5	7243	1.0	7.5
Kentucky	544	6.3	12.5	405	0.7	5.9
Michigan	213	0.0	4.2	539	0.2	3.7
New York City	328	0.9	3.7	597	0.3	4.4
West Virginia	244	0.0	6.6	276	0.0	6.2
California	785	0.0	1.3	2315	0.1	1.1
Washington	260	3.8	16.9	812	5.8	24.8
South Carolina	1642	0.7	10.8	384	0.5	5.7
Massachusetts	439	2.1	9.3	1915	0.7	10.7

Plasma Vitamin A (micrograms/100 ml) Deficient and Low Standards

	Deficient	Low	Acceptable
All Ages	<10	10-19	≥20

Table 9B. Comparison of Number, Percent Deficient and Percent Deficient and/or Low Between Poverty Income Ratio Groups for Selected Biochemical by Seven States and New York City Nutrition Surveys, 1968-1970 (Preliminary)

VITAMIN A

State	Poverty Income Ratio														
	<1.00			1.00-1.49			1.50-1.99			2.00-2.49			2.50 and Over		
	Number	% Deficient	% Deficient and Low	Number	% Deficient	% Deficient and Low	Number	% Deficient	% Deficient and Low	Number	% Deficient	% Deficient and Low	Number	% Deficient	% Deficient and Low
Total	4455	1.5	8.5	2498	0.8	7.2	1442	1.2	9.0	1080	0.9	6.8	2223	0.8	7.1
Kentucky	544	6.3	12.5	196	1.5	7.1	80	0.0	1.3	45	0.0	4.4	84	0.0	8.3
Michigan	213	0.0	4.2	169	0.6	6.5	129	0.0	4.7	82	0.0	1.2	159	0.0	1.3
New York City	328	0.9	3.7	336	0.3	5.7	112	0.0	1.8	67	0.0	5.9	82	1.2	1.2
West Virginia	244	0.0	6.6	106	0.0	11.3	57	0.0	1.8	48	0.0	6.3	65	0.0	1.5
California	785	0.0	1.3	729	0.1	2.3	480	0.0	0.2	314	0.3	1.3	792	0.0	0.5
Washington	260	3.8	16.9	182	4.4	20.9	187	7.5	38.0	128	6.3	23.4	315	2.5	19.7
South Carolina	1642	0.7	10.8	259	1.9	5.4	71	0.0	5.6	38	2.6	7.9	16	0.0	6.3
Massachusetts	439	2.1	9.3	521	0.2	10.6	326	0.9	13.2	358	0.0	7.5	710	1.4	11.1

Plasma Vitamin A (micrograms/100 ml) Deficient and Low Standards			
	Deficient	Low	Acceptable
All Ages	<10	10-19	≥20

Table 9C. Comparison of Number, Percent Deficient, and Percent Deficient and Low Between Males and Females for Selected Biochemical by Seven States and New York City Nutrition Surveys, 1968-1970 (Preliminary)

VITAMIN A

State	Male			Female		
	Number	% Deficient	% Deficient and Low	Number	% Deficient	% Deficient and Low
Total	5615	1.3	8.0	7379	1.1	7.3
Kentucky	460	3.3	8.5	566	4.1	9.7
Michigan	382	0.0	3.4	503	0.2	5.0
New York City	472	0.4	4.2	615	0.5	3.4
West Virginia	294	0.0	7.1	348	0.0	8.0
California	1537	0.0	1.6	2134	0.1	0.9
Washington	484	8.3	24.6	560	5.0	24.8
South Carolina	883	0.9	11.8	1265	0.4	8.1
Massachusetts	1103	0.7	9.9	1388	1.2	10.5

Plasma Vitamin A (micrograms/100 ml) Deficient and Low Standards

	Deficient	Low	Acceptable
All Ages	< 10	10-19	≥ 20

Table 9D. Comparison of Number, Percent Deficient and Percent Deficient and/or Low Between Age Groups for Selected Biochemical by Seven States and New York City Nutrition Surveys, 1968-1970 (Preliminary)

VITAMIN A

State	Age Groups																	
	<6			6-9			10-16			17-49			50-59			60 Yrs. and Over		
	Number	% Deficient	% Deficient and Low	Number	% Deficient	% Deficient and Low	Number	% Deficient	% Deficient and Low	Number	% Deficient	% Deficient and Low	Number	% Deficient	% Deficient and Low	Number	% Deficient	% Deficient and Low
Total	561	2.1	15.5	1372	2.1	15.3	3711	1.3	9.6	4852	1.0	6.0	1002	0.3	2.9	1826	0.7	3.2
Kentucky	78	1.3	12.8	127	7.1	17.3	215	6.0	10.2	316	3.8	7.6	110	0.0	3.6	179	1.7	6.7
Michigan	40	0.0	5.0	94	0.0	12.8	361	0.0	4.4	189	0.5	3.7	34	0.0	2.9	167	0.0	0.0
New York City	47	0.0	6.4	104	0.0	5.8	371	1.3	6.2	385	0.0	2.1	63	0.0	0.0	123	0.0	0.8
West Virginia	13	0.0	7.7	51	0.0	21.6	225	0.0	13.7	124	0.0	3.2	36	0.0	2.8	193	0.0	0.5
California	145	0.0	1.4	363	0.0	3.0	767	0.0	2.6	1615	0.1	0.4	324	0.0	0.9	497	0.0	0.4
Washington	57	10.5	28.1	176	6.8	33.0	301	6.6	26.6	535	4.5	21.9	104	1.0	8.7	152	5.9	17.8
South Carolina	141	3.5	31.2	256	1.6	20.7	890	0.4	8.5	492	0.2	5.5	121	0.0	0.0	246	0.0	2.8
Massachusetts	40	0.0	22.5	201	2.0	18.9	581	1.2	15.5	1196	0.9	8.2	210	1.0	5.2	269	0.0	3.3

[1] Texas and Louisiana excluded.

Plasma Vitamin A (micrograms/100 ml) Deficient and Low Standards			
	Deficient	Low	Acceptable
All Ages	< 10	10-19	≥ 20

Table 9E. Comparison of Number, Percent Deficient, and Percent Deficient and Low Between Ethnic Groups for Selected Biochemical by Seven States and New York City Nutrition Surveys, 1968-1970 (Preliminary)

VITAMIN A

State	White			Negro			Spanish American			Oriental			American Indian		
	Number	% Deficient	% Deficient and Low	Number	% Deficient	% Deficient and Low	Number	% Deficient	% Deficient and Low	Number	% Deficient	% Deficient and Low	Number	% Deficient	% Deficient and Low
Total	7821	1.4	8.4	4200	1.2	8.9	1846	0.2	2.3	225	0.0	2.7	297	1.4	14.9
Kentucky	797	1.6	6.0	229	10.9	20.1	—	—	—	—	—	—	—	—	—
Michigan	554	0.0	2.2	331	0.3	7.9	—	—	—	—	—	—	—	—	—
New York City	157	0.0	0.6	480	0.6	5.4	450	0.4	3.1	9	0.0	0.0	—	—	—
West Virginia	596	0.0	7.4	46	0.0	10.9	—	—	—	—	—	—	—	—	—
California	1698	0.1	1.0	540	0.0	1.9	1252	0.1	1.3	181	0.0	0.6	40	0.0	2.5
Washington	989	6.7	24.5	55	3.6	29.1	10	0.0	40.0	24	0.0	20.8	257	1.6	16.8
South Carolina	106	0.0	8.5	2042	0.6	9.7	—	—	—	—	—	—	—	—	—
Massachusetts	2044	0.9	10.2	325	1.9	12.1	122	0.0	7.4	11	0.0	0.0	—	—	—

Plasma Vitamin A (micrograms/100 ml) Deficient and Low Standards

	Deficient	Low	Acceptable
All Ages	< 10	10-19	≥ 20

C. VITAMIN C

The data on serum vitamin C levels are presented in Tables 10A—10E. As was seen in data previously presented, the prevalence of potentially abnormal values is greater in the below poverty groups as compared to the groups living above poverty. The data suggest that there is little relationship between age and vitamin C levels (Table 10D). There is some suggestion that minority groups may have more of a problem than whites (Table 10E).

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Insofar as serum vitamin C levels are a reflection of dietary intake of vitamin C, there does not seem to be a major problem with vitamin C nutriture in the population groups surveyed except among the poor whites and Negroes in Kentucky, West Virginia, Texas, and Louisiana.

Table 10A. Comparison of Number, Percent Deficient and Percent Deficient and/or Low Between Persons Below Poverty with Persons Above Poverty for Selected Biochemical by Ten States and New York City Nutrition Surveys, 1968-1970 (Preliminary)

State	VITAMIN C					
	Below Poverty[1]			Above Poverty		
	Number	% Deficient[1]	% Deficient and Low	Number	% Deficient[1]	% Deficient and Low
Total	6693	1.1	7.2	9152	0.5	4.3
Texas	1387	N.A.	12.0	759	N.A.	11.0
Louisiana	923	N.A.	15.0	549	N.A.	9.0
New York State	140	0.7	3.6	746	0.3	2.3
Kentucky	652	2.9	8.9	457	1.5	7.7
Michigan	203	0.0	0.0	522	0.0	0.2
New York City	324	0.0	1.5	597	0.0	0.5
West Virginia	232	4.3	9.9	269	1.5	3.7
California	663	0.2	2.6	2025	0.4	3.2
Washington	324	0.3	2.8	1066	0.3	1.3
South Carolina	1434	0.8	2.9	354	0.3	1.7
Massachusetts	411	1.2	4.9	1808	0.9	5.9

[1] Texas and Louisiana excluded.
N.A.—Not Available.

Serum Vitamin C (mg/100 ml) Deficient and Low Standards			
	Deficient	Low	Acceptable
All Ages	<0.1	0.1-0.19	≥0.2

Table 10B. Comparison of Number, Percent Deficient and Percent Deficient and/or Low Between Poverty Income Ratio Groups for Selected Biochemical by Ten States and New York City Nutrition Surveys, 1968-1970 (Preliminary)

VITAMIN C

State	Poverty Income Ratio														
	<1.00			1.00-1.49			1.50-1.99			2.00-2.49 [1]			2.50 and Over		
	Number	% Deficient [2]	% Deficient and Low	Number	% Deficient [2]	% Deficient and Low	Number	% Deficient [2]	% Deficient and Low	Number	% Deficient [2]	% Deficient and Low	Number	% Deficient	% Deficient and Low
Total	6610	1.1	7.1	2926	0.6	4.2	1843	0.8	4.8	1809	0.7	5.0	2576	0.5	3.5
Texas	1304	N.A.	12.0	383	N.A.	10.0	195	N.A.	13.0	183	N.A.	10.0	—	—	—
Louisiana	923	N.A.	14.2	58	N.A.	3.0	62	N.A.	18.0	429	N.A.	9.0	—	—	—
New York State	140	0.7	3.6	121	0.0	4.1	144	0.0	2.1	108	1.9	5.6	373	0.0	0.8
Kentucky	652	2.9	8.9	226	2.7	6.2	89	3.4	12.4	53	1.9	7.5	89	1.1	6.7
Michigan	203	0.0	0.0	157	0.0	0.0	130	0.0	0.0	82	0.0	0.0	153	0.0	0.7
New York City	324	0.0	1.5	333	0.0	0.3	118	0.0	0.0	67	0.0	1.5	79	0.0	1.3
West Virginia	232	4.3	9.9	104	1.9	2.9	55	3.6	7.3	49	0.0	0.0	61	0.0	4.9
California	663	0.2	2.6	608	0.3	3.6	413	0.5	3.4	280	0.0	1.8	724	0.7	3.3
Washington	324	0.3	2.8	205	0.0	0.0	262	0.8	1.5	180	0.6	1.1	419	0.0	1.9
South Carolina	1434	0.8	2.9	235	0.0	0.9	66	1.5	3.0	35	0.0	2.9	18	0.0	5.6
Massachusetts	411	1.2	4.9	496	1.0	7.1	309	0.6	4.5	343	1.2	4.4	660	0.9	6.4

[1] Interpret as 2.0 and over for Texas and Louisiana.
[2] Texas and Louisiana excluded.
N.A.—Not Available.

Serum Vitamin C (mg/100 ml) Deficient and Low Standards			
	Deficient	Low	Acceptable
All Ages	<0.1	0.1-0.19	≥0.2

Table 10C. Comparison of Number, Percent Deficient, and Percent Deficient and Low Between Males and Females for Selected Biochemical by Ten States and New York City Nutrition Surveys, 1968-1970 (Preliminary)

VITAMIN C

State	Male			Female		
	Number	% Deficient[1]	% Deficient and Low	Number	% Deficient[1]	% Deficient and Low
Total	8481	0.9	7.1	11454	0.6	6.0
Texas	1051	N.A.	12.0	1526	N.A.	12.0
Louisiana	1576	N.A.	15.0	2201	N.A.	13.0
New York State	456	0.2	3.3	517	0.4	1.7
Kentucky	537	2.8	8.8	668	2.5	8.1
Michigan	361	0.0	0.3	488	0.0	0.4
New York City	469	0.0	0.9	612	0.0	0.7
West Virginia	280	2.5	7.1	339	2.4	5.0
California	1308	0.6	3.5	1879	0.2	2.4
Washington	631	0.5	2.5	788	0.3	1.1
South Carolina	775	0.8	3.2	1123	0.5	2.0
Massachusetts	1037	1.2	6.7	1313	0.8	4.6

N.A.—Not Available
[1]Texas and Louisiana excluded.

Serum Vitamin C (mg/100 ml) Deficient and Low Standards			
	Deficient	Low	Acceptable
All Ages	< 0.1	0.1 - 0.19	≥ 0.2

Table 10D. Comparison of Number, Percent Deficient, and Percent Deficient and/or Low Between Age Groups for Selected Biochemical by Ten States and New York City Nutrition Surveys(1968-1970 (Preliminary)

VITAMIN C

State	Age Groups																	
	<6			6-9			10-16			17-49			50-59			60 Yrs. and Over		
	Number	% Deficient[1]	% Deficient and Low	Number	% Deficient[1]	% Deficient and Low	Number	% Deficient[1]	% Deficient and Low	Number	% Deficient	% Deficient and Low	Number	% Deficient[1]	% Deficient and Low	Number	% Deficient[1]	% Deficient and Low
Total	**1176**	**0.7**	**6.5**	**2244**	**0.4**	**4.8**	**5367**	**0.4**	**4.7**	**6920**	**0.8**	**7.6**	**1614**	**1.3**	**7.8**	**2920**	**1.1**	**7.6**
Texas	120	N.A.	10.0	343	N.A.	10.5	736	N.A.	13.0	825	N.A.	12.7	210	N.A.	11.0	343	N.A.	10.1
Louisiana	509	N.A.	10.4	531	N.A.	9.0	902	N.A.	11.0	1066	N.A.	18.2	305	N.A.	16.0	464	N.A.	17.7
New York State	21	0.0	0.0	89	0.0	0.0	138	0.0	0.7	327	0.6	4.3	86	0.0	3.5	323	0.3	1.9
Kentucky	156	2.6	5.1	155	1.9	5.2	227	0.0	3.5	339	2.7	12.1	127	6.3	12.6	200	4.0	10.0
Michigan	27	0.0	0.0	80	0.0	0.0	350	0.0	0.6	187	0.0	0.5	32	0.0	0.0	173	0.0	0.0
New York City	47	0.0	0.0	102	0.0	0.0	371	0.0	0.5	385	0.0	1.0	61	0.0	1.6	121	0.0	0.8
West Virginia	14	0.0	0.0	50	2.0	4.0	221	2.7	5.0	121	2.5	6.6	36	0.0	2.8	177	4.0	8.5
California	66	0.0	0.0	279	0.4	0.7	705	0.0	0.9	1457	0.4	3.3	301	0.7	3.3	417	0.7	6.5
Washington	98	0.0	1.1	218	0.0	3.7	360	0.6	0.8	641	0.2	2.5	148	0.7	2.7	211	0.5	2.4
South Carolina	91	0.0	0.0	207	0.5	1.0	787	0.4	1.1	467	1.3	4.1	114	1.8	6.1	231	0.0	4.8
Massachusetts	37	0.0	5.4	190	0.0	1.1	570	0.7	3.0	1105	1.3	6.8	194	0.5	6.2	260	1.2	8.1

[1] Texas and Louisiana excluded.

Serum Vitamin C (mg/100 ml) Deficient and Low Standards			
	Deficient	Low	Acceptable
All Ages	<0.1	0.1-0.19	≥0.2

Table 10E. Comparison of Number, Percent Deficient, and Percent Deficient and Low Between Ethnic Groups for Selected Biochemical by Ten States and New York City Nutrition Surveys, 1968-1970 (Preliminary)

VITAMIN C

State	White			Negro			Spanish American			Oriental			American Indian		
	Number	% Deficient[1]	% Deficient and Low	Number	% Deficient[1]	% Deficient and Low	Number	% Deficient[2]	% Deficient and Low	Number	% Deficient	% Deficient and Low	Number	% Deficient	% Deficient and Low
Total	**9221**	**0.8**	**5.7**	**7564**	**0.7**	**8.3**	**3054**	**0.4**	**4.6**	**216**	**0.5**	**3.9**	**289**	**0.3**	**1.4**
Texas	296	N.A.	16.0	931	N.A.	15.0	1350	N.A.	8.0	—	—	—	—	—	—
Louisiana	1045	N.A.	17.0	2748	N.A.	13.0	—	—	—	—	—	—	—	—	—
New York State	835	0.4	2.1	138	0.0	5.1	11	0.0	0.0	—	—	—	—	—	—
Kentucky	931	2.0	7.4	274	4.7	11.6	—	—	—	—	—	—	—	—	—
Michigan	548	0.0	0.4	301	0.0	0.3	—	—	—	—	—	—	—	—	—
New York City	152	0.0	2.0	480	0.0	0.2	449	0.0	0.9	9	0.0	0.0	—	—	—
West Virginia	579	2.6	5.5	40	0.0	12.5	—	—	—	—	—	—	—	—	—
California	1437	0.5	3.0	497	0.2	5.4	1109	0.2	1.8	144	0.7	1.4	38	2.6	2.6
Washington	1373	0.4	1.9	46	0.0	0.0	21	0.0	0.0	52	0.0	12.5	251	0.0	1.2
South Carolina	99	0.0	1.0	1799	0.7	2.6	—	—	—	—	—	—	—	—	—
Massachusetts	1926	0.8	5.6	310	1.0	4.6	114	3.5	6.2	11	0.0	0.0	—	—	—

N.A.—Not Available
[1]Texas and Louisiana excluded
[2]Texas excluded

Serum Vitamin C (mg/100 ml) Deficient and Low Standards			
	Deficient	Low	Acceptable
All Ages	< 0.1	0.1 - 0.19	≥ 0.2

D. RIBOFLAVIN

Tables 11A—11E present data for urinary riboflavin excretion as measured in casual urine samples. Individuals living below the poverty line generally had a higher prevalence of values below standard than those living above poverty. Children had more deficient and low values than subjects in older age groups. As previously noted for the other biochemical values reported, minority group individuals had more values in the deficient and low range than the whites. The significance of these deficient and low values is presently unknown.

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Table 11A. Comparison of Number, Percent Deficient, and Percent Deficient and/or Low Between Persons Below Poverty with Persons Above Poverty for Selected Biochemical by Ten States and New York City Nutrition Surveys, 1968-1970 (Preliminary)

RIBOFLAVIN

State	Below Poverty			Above Poverty		
	Number	% Deficient [1]	% Deficient and Low	Number	% Deficient [1]	% Deficient and Low
Total	6896	2.9	17.8	9941	1.1	9.0
Texas	1675	N.A.	22.0	858	N.A.	17.0
Louisiana	118	N.A.	11.0	156	N.A.	11.0
New York State	171	0.0	5.3	839	0.0	3.5
Kentucky	613	3.6	10.9	465	0.9	8.2
Michigan	232	0.9	13.4	551	0.7	12.0
New York City	354	1.1	9.6	656	0.9	9.1
West Virginia	251	3.2	13.5	296	2.7	8.1
California	1020	1.4	9.2	2692	0.7	6.5
Washington	395	2.0	10.9	1217	1.2	10.6
South Carolina	1620	5.2	31.6	346	4.9	23.1
Massachusetts	447	1.1	5.4	1865	1.2	6.9

[1] Texas and Louisiana excluded.
N.A.—Not Available.

Urinary Riboflavin Deficient and Low Standards (micrograms/gm creatinine)			
	Deficient	Low	Acceptable
1-3 years	<150	150-499	≥500
4-6 years	<100	100-299	≥300
7-9 years	<85	85-269	≥270
10-15 years	<70	70-199	≥200
Adult	<27	27-79	≥80
Pregnant 3rd Trimester	<30	30-89	≥90

Table 11B. Comparison of Number, Percent Deficient and Percent Deficient and/or Low Between Poverty Income Ratio Groups for Selected Biochemical by Ten States and New York City Nutrition Surveys, 1968-1970 (Preliminary)

RIBOFLAVIN

State	Poverty Income Ratio														
	<1.00			1.00-1.49			1.50-1.99			2.00-2.49 [1]			2.50 and Over		
	Number	% Deficient [2]	% Deficient and Low	Number	% Deficient [2]	% Deficient and Low	Number	% Deficient [2]	% Deficient and Low	Number	% Deficient [2]	% Deficient and Low	Number	% Deficient	% Deficient and Low
Total	6876	2.9	17.6	3361	1.3	11.2	2031	0.8	9.3	1674	0.8	7.8	2844	0.9	7.2
Texas	1655	N.A.	21.1	423	N.A.	19.0	206	N.A.	23.0	198	N.A.	13.0	—	—	—
Louisiana	118	N.A.	11.1	21	N.A.	24.0	12	N.A.	16.0	123	N.A.	8.0	—	—	—
New York State	171	0.0	5.3	151	0.0	5.3	153	0.0	3.3	135	0.0	3.7	400	0.0	2.8
Kentucky	613	3.6	10.9	212	0.0	7.1	99	1.0	6.1	53	1.9	7.5	101	2.0	12.9
Michigan	232	0.9	13.4	173	1.2	15.6	128	0.8	12.5	79	0.0	12.7	171	0.6	7.6
New York City	354	1.1	9.6	382	1.6	11.3	125	0.0	7.2	69	0.0	7.2	80	0.0	3.8
West Virginia	251	3.2	13.5	105	1.9	9.5	67	4.5	9.0	57	3.5	7.0	67	1.5	6.0
California	1020	1.4	9.2	869	0.7	7.2	556	0.7	5.2	377	0.0	5.3	890	1.1	7.2
Washington	395	2.0	10.9	247	1.6	12.6	310	1.0	12.9	202	1.5	8.4	458	0.9	9.0
South Carolina	1620	5.2	31.6	240	4.5	23.3	58	1.7	19.0	30	3.3	33.3	18	5.6	16.7
Massachusetts	447	1.1	5.4	538	1.5	7.2	317	0.6	5.4	351	1.1	5.7	659	1.2	7.9

[1] Interpret as 2.0 and over for Texas and Louisiana.
[2] Texas and Louisiana excluded.
N.A.—Not Available.

Urinary Riboflavin Deficient and Low Standards (micrograms/gm creatinine)			
	Deficient	Low	Acceptable
1-3 years	<150	150-499	≥500
4-6 years	<100	100-299	≥300
7-9 years	<85	85-269	≥270
10-15 years	<70	70-199	≥200
Adult	<27	27-79	≥80
Pregnant 3rd Trimester	<30	30-89	≥90

Table 11C. Comparison of Number, Percent Deficient, and Percent Deficient and Low Between Males and Females for Selected Biochemical by Ten States and New York City Nutrition Surveys, 1968-1970 (Preliminary)

RIBOFLAVIN

State	Male			Female		
	Number	% Deficient[1]	% Deficient and Low	Number	% Deficient[1]	% Deficient and Low
Total	8595	1.6	11.8	11130	1.8	13.5
Texas	1293	N.A.	22.0	1747	N.A.	21.0
Louisiana	385	N.A.	17.0	452	N.A.	13.0
New York State	509	0.2	3.7	604	0.0	3.5
Kentucky	534	2.2	8.2	631	2.4	10.9
Michigan	391	0.5	9.7	534	0.7	14.6
New York City	506	1.2	8.3	663	0.6	9.4
West Virginia	316	2.5	9.8	369	2.4	10.3
California	1863	1.0	6.1	2515	0.9	7.9
Washington	843	1.3	9.6	1063	1.7	12.2
South Carolina	880	4.9	28.1	1185	5.5	31.1
Massachusetts	1075	0.7	4.8	1367	1.6	8.0

[1]Texas and Louisiana excluded.
N.A.—Not Available

Urinary Riboflavin Deficient and Low Standards (micrograms/gm creatinine)

	Deficient	Low	Acceptable
1-3 years	< 150	150-499	≥ 500
4-6 years	< 100	100-299	≥ 300
7-9 years	< 85	85-269	≥ 270
10-15 years	< 70	70-199	≥ 200
Adult	< 27	27-79	≥ 80
Pregnant 3rd Trimester	< 30	30-89	≥ 90

Table 11D. Comparison of Number, Percent Deficient, and Percent Deficient and/or Low Between Age Groups for Selected Biochemical by Ten States and New York City Nutrition Surveys, 1968-1970 (Preliminary)

RIBOFLAVIN

State	Age Groups																	
	<6			6-9			10-16			17-49			50-59			60 Yrs. and Over		
	Number	% Deficient [1]	% Deficient and Low	Number	% Deficient [1]	% Deficient and Low	Number	% Deficient [1]	% Deficient and Low	Number	% Deficient [1]	% Deficient and Low	Number	% Deficient [1]	% Deficient and Low	Number	% Deficient [1]	% Deficient and Low
Total	1744	4.3	19.9	2503	1.9	14.2	5081	2.5	17.1	6326	0.8	9.6	1404	1.0	7.9	2726	1.0	8.0
Texas	323	N.A.	29.4	491	N.A.	26.7	780	N.A.	30.5	867	N.A.	13.4	213	N.A.	9.9	366	N.A.	10.1
Louisiana	87	N.A.	29.7	76	N.A.	19.7	315	N.A.	17.0	165	N.A.	8.4	44	N.A.	9.0	150	N.A.	7.2
New York State	87	1.1	6.9	104	0.0	4.8	147	0.0	2.7	349	0.0	3.4	91	0.0	3.3	345	0.0	2.9
Kentucky	123	4.9	14.6	153	3.3	9.8	231	4.3	15.6	349	0.6	6.9	124	0.8	6.5	185	1.6	6.5
Michigan	76	3.9	22.4	89	0.0	11.2	368	0.5	13.6	191	0.0	9.4	31	0.0	6.5	170	0.6	11.2
New York City	102	0.0	2.9	126	2.4	10.3	377	1.6	13.0	383	0.3	6.5	63	0.0	9.5	127	0.0	7.9
West Virginia	44	0.0	11.4	59	5.1	13.6	231	3.0	13.9	119	1.7	5.9	42	4.8	9.5	190	1.6	6.8
California	421	1.9	8.8	630	0.8	6.7	856	1.1	8.8	1615	0.6	6.6	328	1.2	5.2	502	1.0	6.8
Washington	202	1.5	17.8	277	3.2	14.4	391	2.6	12.0	739	0.9	10.3	148	0.7	4.1	207	0.0	3.9
South Carolina	197	16.2	48.2	246	4.1	26.8	844	5.9	30.9	430	1.9	29.1	114	1.8	21.1	233	2.6	19.3
Massachusetts	82	4.9	12.2	252	0.4	4.4	541	1.1	4.3	1119	1.3	7.5	206	0.5	7.8	251	1.2	7.2

[1] Texas and Louisiana excluded.

Urinary Riboflavin Deficient and Low Standards (micrograms/gm creatinine)

	Deficient	Low	Acceptable
1-3 years	< 150	150-499	≥ 500
4-6 years	< 100	100-299	≥ 300
7-9 years	< 85	85-269	≥ 270
10-15 years	< 70	70-199	≥ 200
Adule	< 27	27-79	≥ 80
Pregnant 3rd Trimester	< 30	30-89	≥ 90

Table 11E. Comparison of Number, Percent Deficient, and Percent Deficient and Low Between Ethnic Groups for Selected Biochemical by Ten States and New York City Nutrition Surveys, 1968-1970 (Preliminary)

RIBOFLAVIN

State	White			Negro			Spanish American			Oriental			American Indian		
	Number	% Deficient[1]	% Deficient and Low	Number	% Deficient[1]	% Deficient and Low	Number	% Deficient[2]	% Deficient and Low	Number	% Deficient	% Deficient and Low	Number	% Deficient	% Deficient and Low
Total	10318	1.2	7.8	6123	3.2	21.9	3778	0.7	11.6	278	1.6	6.8	102	1.9	9.8
Texas	332	N.A.	13.0	1154	N.A.	26.0	1554	N.A.	19.0	—	—	—	—	—	—
Louisiana	288	N.A.	11.0	514	N.A.	17.0	—	—	—	—	—	—	—	—	—
New York State	927	0.1	2.8	186	0.0	7.6	11	0.0	0.0	—	—	—	—	—	—
Kentucky	889	2.5	9.1	276	1.8	11.6	—	—	—	—	—	—	—	—	—
Michigan	563	0.5	7.6	362	0.8	20.1	—	—	—	—	—	—	—	—	—
New York City	162	0.0	2.5	498	1.8	13.4	509	0.2	6.5	16	0.0	18.8	—	—	—
West Virginia	636	2.4	9.9	49	4.1	12.3	—	—	—	—	—	—	—	—	—
California	1909	1.0	6.5	672	1.1	12.7	1497	0.6	5.4	225	1.8	7.1	75	1.3	8.0
Washington	1545	1.2	9.8	68	1.5	10.3	27	0.0	3.7	24	0.0	0.0	27	3.7	14.8
South Carolina	110	4.5	24.5	1955	5.3	30.2	—	—	—	—	—	—	—	—	—
Massachusetts	2957	1.0	7.2	389	3.1	20.7	180	3.4	15.1	13	0.0	0.0	—	—	—

N.A.—Not Available
[1]Texas and Louisiana excluded
[2]Texas excluded

Urinary Riboflavin Deficient and Low Standards (micrograms/gm creatinine)

	Deficient	Low	Acceptable
1-3 years	< 150	150-499	≥ 500
4-6 years	< 100	100-299	≥ 300
7-9 years	< 85	85-269	≥ 270
10-15 years	< 70	70-199	≥ 200
Adult	< 27	27-79	≥ 80
Pregnant 3rd Trimester	< 30	30-89	≥ 90

E. COMBINED BIOCHEMICAL VALUES

Tables 12A—12F present biochemical findings combining data of persons having at least two measurements that were deficient or low out of the set of determinations for hemoglobin, vitamin A, vitamin C, and riboflavin. Overall, only 0.2 percent of subjects were in the deficient category on two or more of these measurements while 4.2 percent were deficient or low on two or more. Kentucky and South Carolina had the highest percentage of subjects with two or more deficient or low values. Those individuals living at poverty or near poverty levels had a higher prevalence of two or more abnormalities than those living above the poverty level. Comparisons by sex show no marked differences; the ethnic group comparisons show consistently more low or deficient results for the Negro groups in all the populations surveyed.

Table 12A. Percent of Persons with Two or More Biochemical Values Deficient, Low, or Both in Hemoglobin, Vitamin A, Vitamin C, and Riboflavin by Below and Above Poverty Levels in Eight States and New York City Nutrition Surveys, 1969-1970 (Preliminary)

State	Total Number	Percent Deficient	Percent Deficient and Low	Poverty Income Ratio [1]					
				Below Poverty			Above Poverty		
				Number	% Deficient	% Deficient and Low	Number	% Deficient	% Deficient and Low
Total	18590	0.2	4.2	5776	0.4	7.7	10562	0.1	2.5
New York State	1155	0.0	1.6	175	0.0	2.3	874	0.0	1.4
Kentucky	1297	0.5	6.1	700	0.9	8.0	499	0.0	4.2
Michigan	948	0.1	3.2	227	0.0	4.4	576	0.2	2.4
New York City	1192	0.0	3.0	354	0.0	3.4	664	0.0	3.2
West Virginia	683	0.3	4.0	259	0.4	5.4	293	0.0	1.7
California	4551	0.0	1.3	1046	0.0	2.0	2829	0.0	1.0
Washington	3860	0.2	3.6	773	0.3	4.1	2430	0.2	3.0
South Carolina	2309	0.4	14.7	1774	0.5	16.4	407	0.2	10.6
Massachusetts	2595	0.1	2.2	468	0.4	1.7	1990	0.0	2.3

[1] Unknown PIR excluded.
Note: Only persons with two or more known values for the four selected biochemicals were considered for this table.

Table 12B. Percent of Persons with Two or More Deficient Biochemical Values in Hemoglobin, Vitamin A, Vitamin C, and Riboflavin by Poverty Income Ratio in Eight States and New York City Nutrition Surveys, 1969-1970 (Preliminary)

State	Total Number	Percent Deficient	Poverty Income Ratio											
			<1.0		1.00-1.49		1.50-1.99		2.00-2.49		2.50+		Unknown	
			Number	% Deficient	Number	% Deficient	Number	% Deficient	Number	% Deficient	Number	% Deficient	Number	% Deficient
Total	18590	0.2	5776	0.4	3326	0.1	2229	0.1	1600	0.1	3407	0.0	2252	0.0
New York State	1155	0.0	175	0.0	155	0.0	162	0.0	137	0.0	420	0.0	106	0.0
Kentucky	1297	0.5	700	0.9	236	0.0	103	0.0	57	0.0	103	0.0	98	0.0
Michigan	948	0.1	227	0.0	176	0.6	140	0.0	87	0.0	173	0.0	145	0.0
New York City	1192	0.0	354	0.0	380	0.0	131	0.0	71	0.0	82	0.0	174	0.0
West Virginia	683	0.3	259	0.4	110	0.0	64	0.0	53	0.0	66	0.0	131	0.8
California	4551	0.0	1046	0.0	906	0.0	587	0.0	396	0.0	940	0.0	676	0.0
Washington	3860	0.2	773	0.3	527	0.2	626	0.5	390	0.0	887	0.0	657	0.0
South Carolina	2309	0.4	1774	0.5	278	0.0	71	0.0	40	2.5	18	0.0	128	0.0
Massachusetts	2595	0.1	468	0.4	558	0.0	345	0.0	369	0.0	718	0.1	137	0.0

Note: Only persons with two or more known biochemical values of the four selected biochemicals were considered for this table.

Table 12C. Percent of Persons with Two or More Deficient and/or Low Biochemical Values in Hemoglobin, Vitamin A, Vitamin C, and Riboflavin by Poverty Income Ratio in Eight States and New York City Nutrition Surveys, 1969-1970 (Preliminary)

State	Total Number	Percent Deficient and Low	Poverty Income Ratio											
			<1.0		1.00-1.49		1.50-1.99		2.00-2.49		2.50+		Unknown	
			Number	% Deficient and Low	Number	% Deficient and Low	Number	% Deficient and Low	Number	% Deficient and Low	Number	% Deficient and Low	Number	% Deficient and Low
Total	18590	4.2	5776	7.7	3326	3.2	2229	2.5	1600	2.1	3407	2.0	2252	3.2
New York State	1155	1.6	175	2.3	155	0.6	162	1.2	137	1.5	420	1.7	106	1.9
Kentucky	1297	6.1	700	8.0	236	3.8	103	5.9	57	5.3	103	2.9	98	1.0
Michigan	948	3.2	227	4.4	176	4.5	140	2.9	87	1.1	173	0.6	145	4.8
New York City	1192	3.0	354	3.4	380	3.7	131	1.5	71	5.6	82	1.2	174	1.1
West Virginia	683	4.0	259	5.4	110	2.7	64	1.6	53	0.0	66	1.5	131	6.1
California	4551	1.3	1046	2.0	906	1.8	587	0.3	396	0.8	940	0.9	676	0.9
Washington	3860	3.6	773	4.1	527	3.8	626	4.2	390	1.5	887	2.5	657	5.5
South Carolina	2309	14.7	1774	16.4	278	9.4	71	7.0	40	25.0	18	11.1	128	6.3
Massachusetts	2595	2.2	468	1.7	558	1.9	345	2.3	369	1.1	718	3.0	137	2.2

Note: Only persons with two or more known values of the four selected biochemicals were considered for this table.

Table 12D. Percent of Persons with Two or More Biochemical Values Deficient, Low, or Both in Hemoglobin, Vitamin A, Vitamin C, and Riboflavin by Sex Breakdown in Eight States and New York City Nutrition Surveys, 1969-1970 (Preliminary)

State	Total Number	Percent Deficient	Percent Deficient and Low	Sex					
				Males			Females		
				Number	% Deficient	% Deficient and Low	Number	% Deficient	% Deficient and Low
Total	18590	0.2	4.2	8129	0.2	4.5	10461	0.1	4.9
New York State	1155	0.0	1.6	536	0.0	2.2	619	0.0	1.0
Kentucky	1297	0.5	6.1	587	0.9	6.6	710	0.1	5.5
Michigan	948	0.1	3.2	403	0.0	2.0	545	0.2	4.2
New York City	1192	0.0	3.0	520	0.0	3.3	672	0.0	2.7
West Virginia	683	0.3	4.0	310	0.3	4.5	373	0.3	3.5
California	4551	0.0	1.3	1914	0.0	1.7	2637	0.0	1.0
Washington	3860	0.2	3.6	1738	0.3	3.6	2122	0.0	3.7
South Carolina	2309	0.4	14.7	969	0.5	15.6	1340	0.4	14.1
Massachusetts	2595	0.1	2.2	1152	0.0	2.5	1443	0.2	1.9

Note: Only persons with two or more known values of the four selected biochemicals were considered for this table.

Table 12E. Percent of Persons with Two or More Deficient Biochemical Values in Hemoglobin, Vitamin A, Vitamin C, and Riboflavin by Ethnic Groups in Eight States and New York City Nutrition Surveys, 1969-1970 (Preliminary)

State	Total Number	Percent Deficient	Ethnic Groups									
			White		Negro		Spanish American		American Indian		Oriental	
			Number	% Deficient	Number	% Deficient	Number	% Deficient	Number	% Deficient	Number	% Deficient
Total	**18590**	**0.2**	**10810**	**0.1**	**4711**	**0.3**	**2290**	**0.0**	**469**	**0.0**	**310**	**0.0**
New York State	1155	0.0	949	0.0	178	0.0	13	0.0	11	0.0	4	0.0
Kentucky	1297	0.5	986	0.5	311	0.3	0	—	0	—	0	—
Michigan	948	0.1	591	0.0	350	0.3	4	0.0	3	0.0	0	—
New York City	1192	0.0	167	0.0	511	0.0	504	0.0	0	—	10	0.0
West Virginia	683	0.3	631	0.2	51	2.0	1	0.0	0	—	0	—
California	4551	0.0	2009	0.0	687	0.0	1548	0.0	78	0.0	229	0.0
Washington	3860	0.2	3223	0.2	134	0.0	82	0.0	366	0.0	55	0.0
South Carolina	2309	0.5	110	0.0	2188	0.5	0	—	11	0.0	0	—
Massachusetts	2595	0.1	2144	0.0	301	0.7	138	0.0	0	—	12	0.0

Note: Only persons with two or more known biochemical values of the four selected biochemicals were considered for this table.

Table 12F. Percent of Persons with Two or more Deficient and/or Low Biochemical Values in Hemoglobin, Vitamin A, Vitamin C, and Riboflavin by Ethnic Groups in Eight States and New York City Nutrition Surveys, 1969-1970 (Preliminary)

State	Total Number	Percent Deficient and Low	Ethnic Groups									
			White		Negro		Spanish American		American Indian		Oriental	
			Number	% Deficient and Low	Number	% Deficient and Low	Number	% Deficient and Low	Number	% Deficient and Low	Number	% Deficient and Low
Total	18590	4.2	10810	2.3	4711	10.3	2290	1.1	469	5.1	310	2.0
New York State	1155	1.6	949	1.3	178	3.4	13	0.0	11	0.0	4	0.0
Kentucky	1297	6.1	986	4.1	311	11.9	0	—	0	—	0	—
Michigan	948	3.2	591	0.5	350	8.0	4	0.0	3	0.0	0	—
New York City	1192	3.0	167	0.6	511	4.9	504	1.8	0	—	10	0.0
West Virginia	682	4.0	631	3.5	51	9.8	1	0.0	0	—	0	—
California	4551	1.3	2009	0.9	687	3.5	1548	0.6	78	2.6	229	0.9
Washington	3860	3.6	3223	3.2	134	8.2	82	1.2	366	6.0	55	7.3
South Carolina	2309	14.7	110	9.1	2188	15.1	0	—	11	0.0	0	—
Massachusetts	2595	2.2	2144	1.6	301	5.7	138	3.6	0	—	12	0.0

Note: Only persons with two or more known biochemical values of the four selected biochemicals were considered for this table.

Figure 2a - Percent of Persons in the Below and Above Poverty Groups With Two or More Deficient Biochemical Values in Hemoglobin, Vitamin A, Vitamin C, and Riboflavin by Ten States and New York City Nutriton Surveys, 1968-1970 (Preliminary)

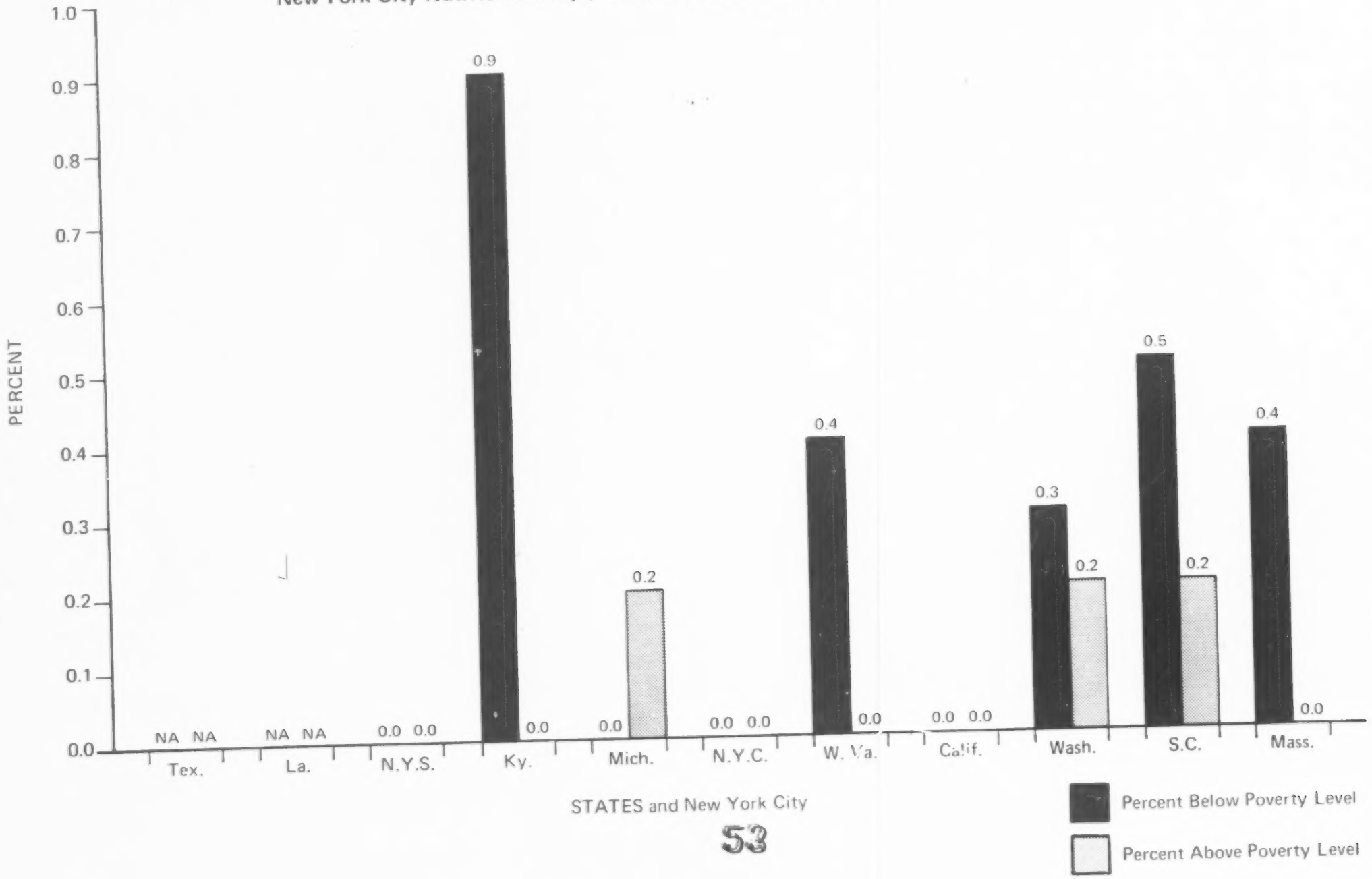

Figure 2b - Percent of Persons in the Below and Above Poverty Groups With Two or More Deficient and/or Low Biochemical Values in Hemoglobin, Vitamin A, Vitamin C, and Riboflavin by Ten States and New York City Nutrition Surveys, 1968-1970 (Preliminary)

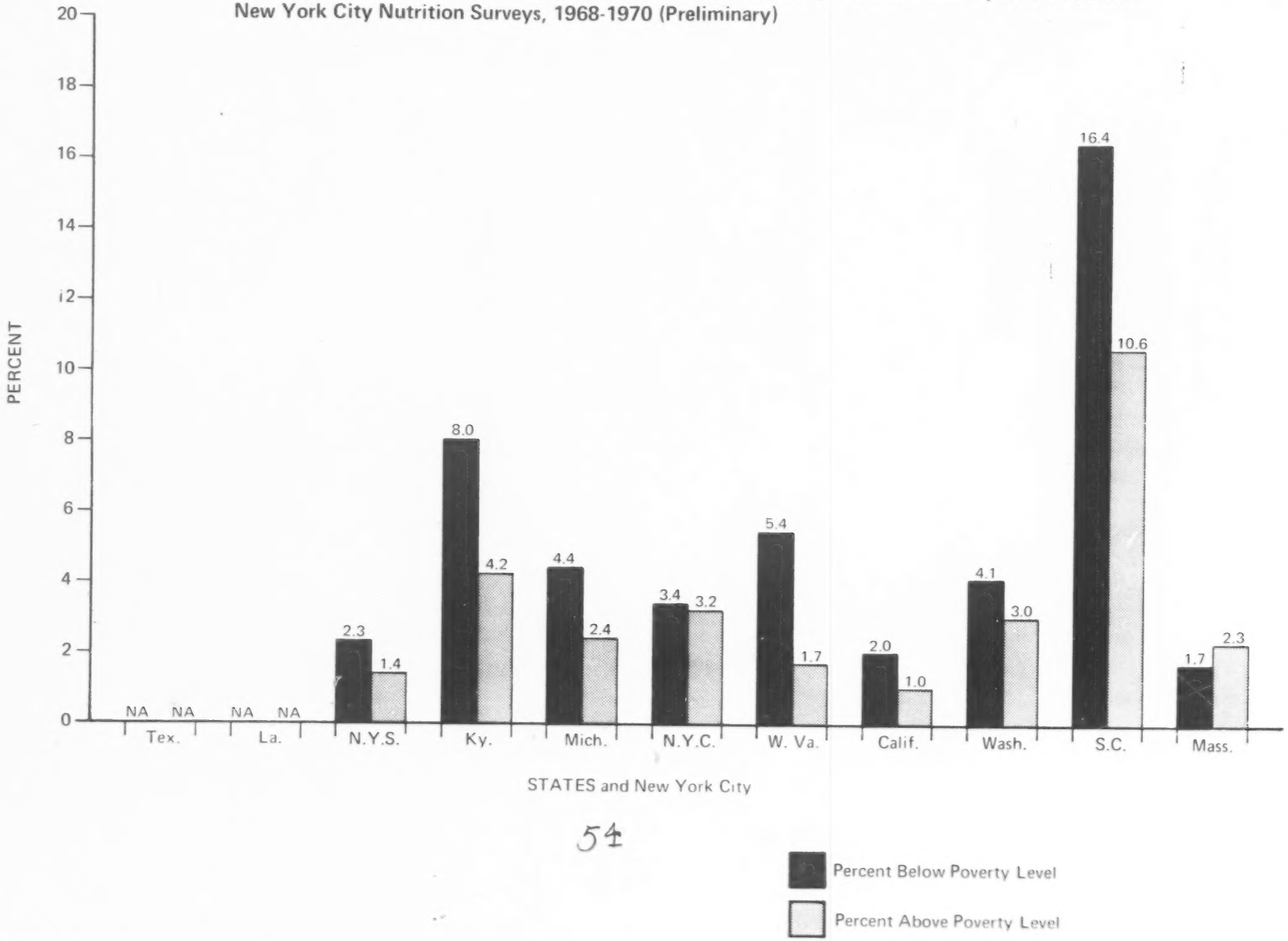

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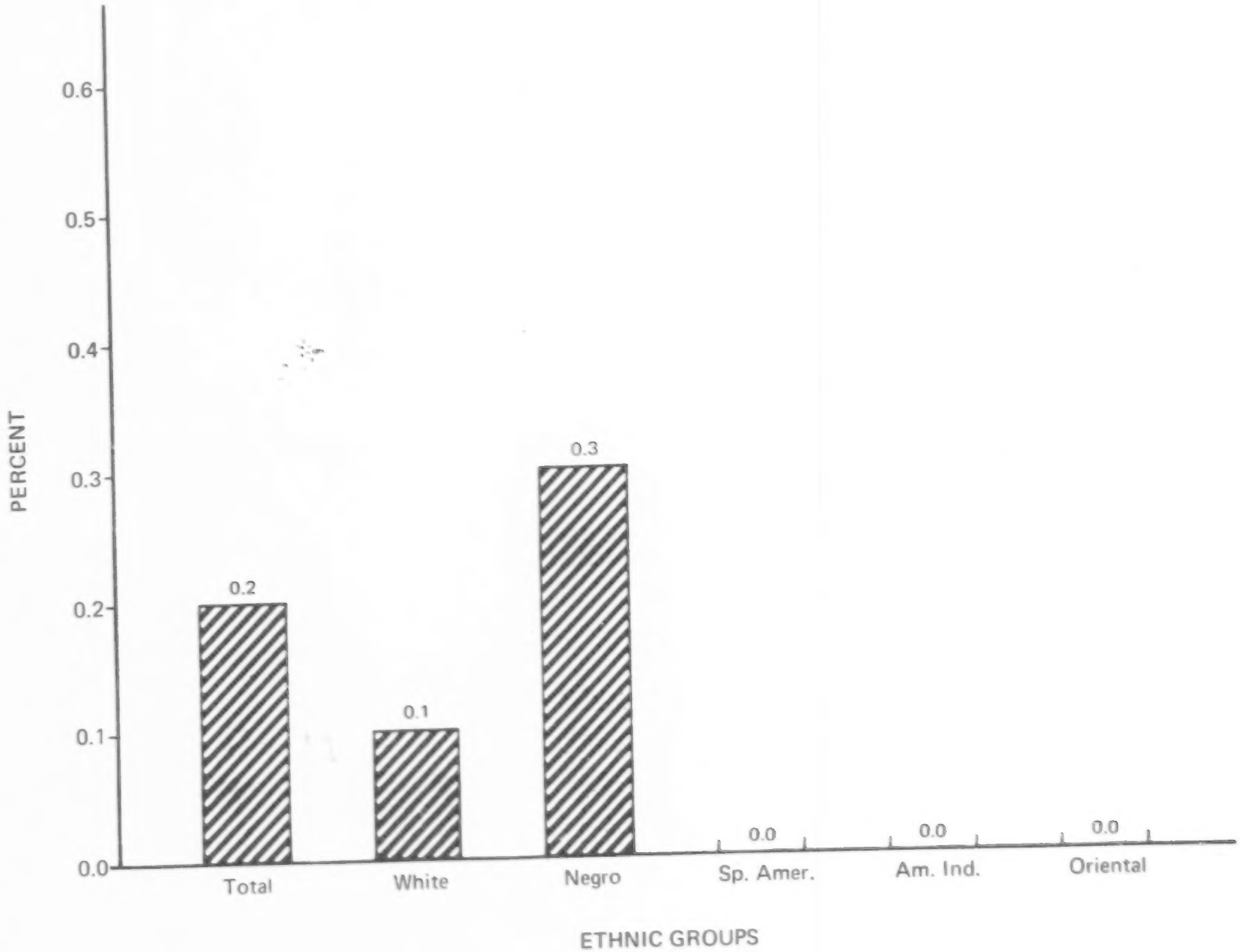
Figure 2c - Percent of Persons With Two or More Deficient Biochemical Values in Hemoglobin, Vitamin A, Vitamin C, and Riboflavin by Ethnic Groups in Eight States and New York City Nutrition Surveys, 1969-1970 (Preliminary)



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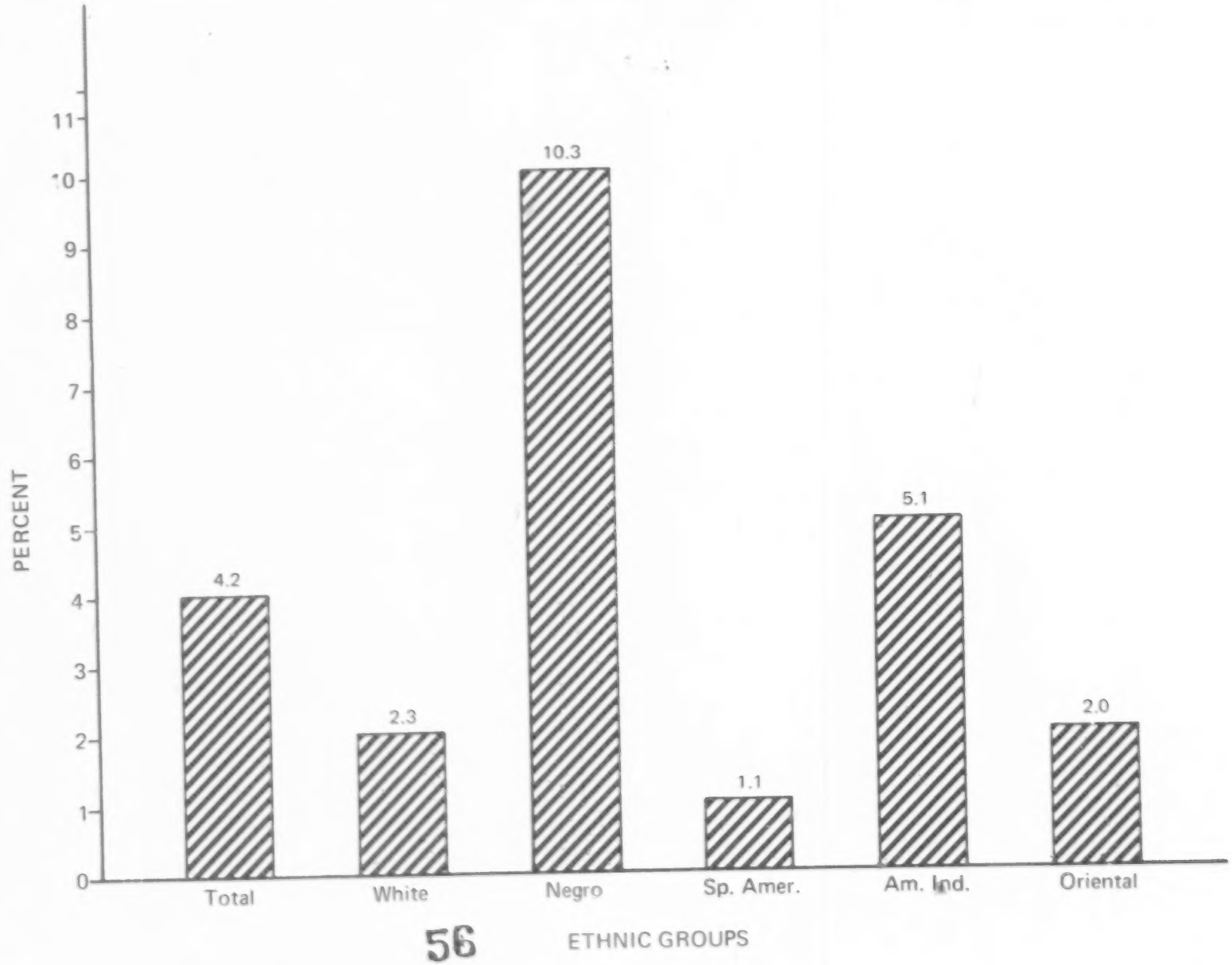
Note: Texas and Louisiana excluded

Figure 2d - Percent of Persons With Two or More Deficient and/or Low Biochemical Values in Hemoglobin, Vitamin A, Vitamin C, and Riboflavin by Ethnic Groups in Eight States and New York City Nutrition Surveys, 1969-1970 (Preliminary)



Note: Texas and Louisiana excluded

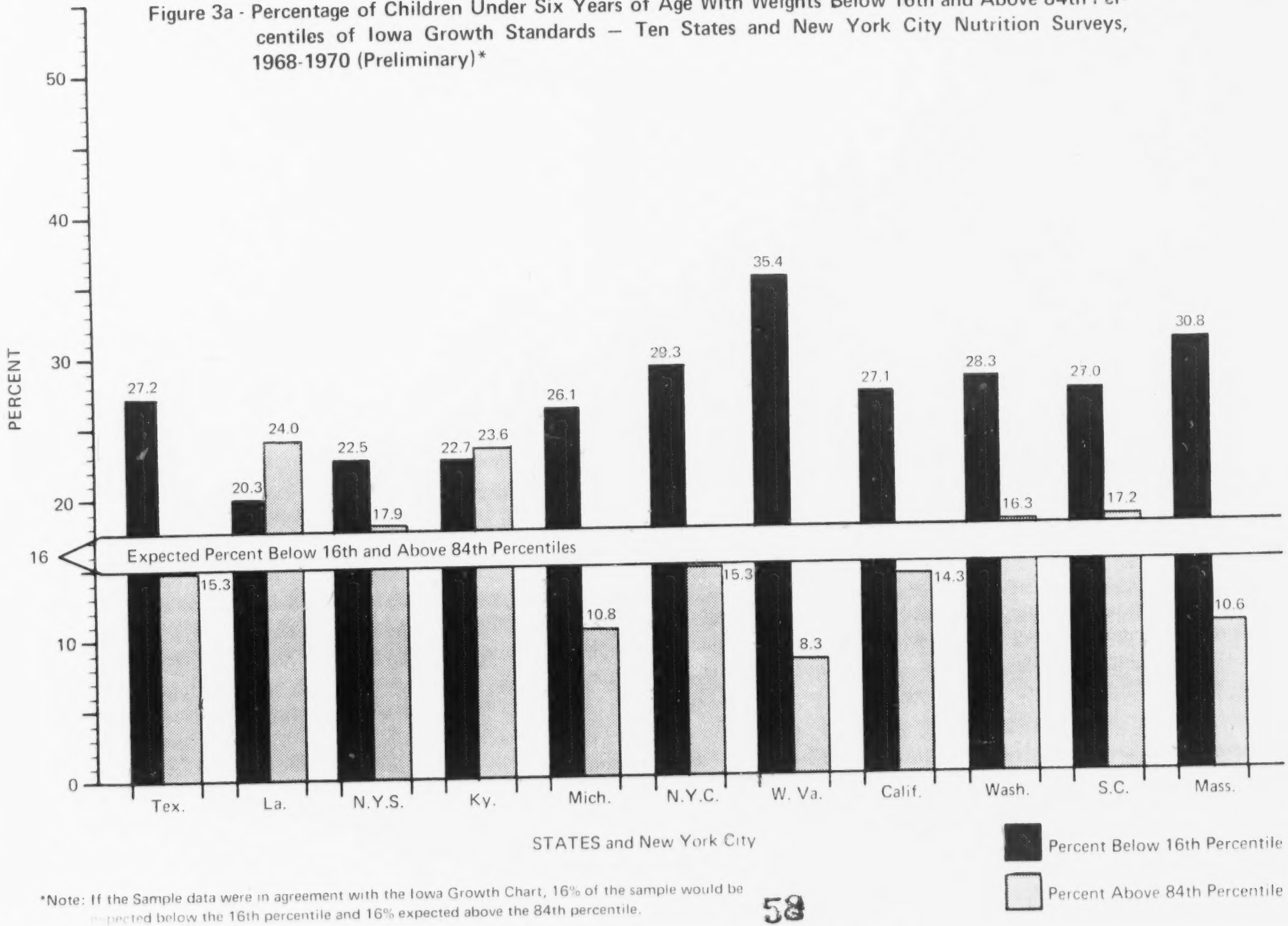
IV. ANTHROPOMETRY

Numerous body dimensions were measured on persons selected for clinical examinations but this presentation gives only height and weight data for preschool children (figures 3a—3f). Comparisons are with the Iowa Growth Charts, standards based primarily on children attending Iowa preschool and school programs in the 1930's. These charts are in wide current use, as arbitrary standards, by physicians in the United States.

Figures 3a and 3b show (for weights and heights respectively) the overall percentages of children in each survey who were below the 16th percentile and above the 84th percentile of the Iowa standard. Figures 3c and 3d, for weights and heights, show the percentages of children below the 16th percentile of the standard, according to whether they are living below or above the poverty line. Figures 3e and 3f show the same comparison for white and Negro children.

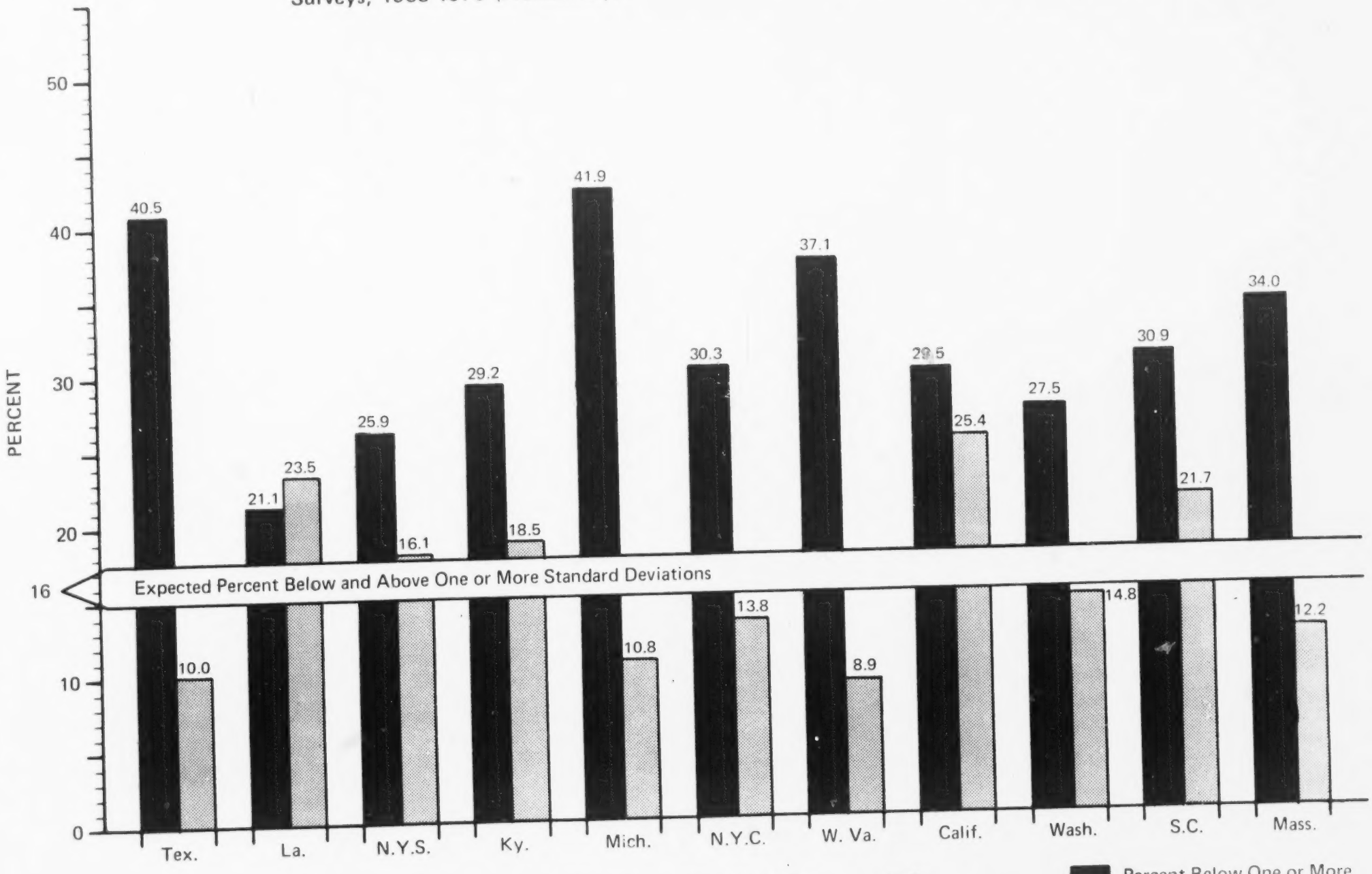
For all the surveys the results generally show an excess of low heights and weights compared to the Iowa standard. Weights tend to be less deviant than heights, indicating children somewhat "behind" but slightly "chunkier for their height" than the standard. In several states an excess of high values were also found, indicating greater variability than obtained among the children who made up the standard; this has been found in several recent surveys by others. The general pattern was a greater percentage of low measurements for children living below the poverty line than for those living above the poverty line. Ethnic group differences were distinct in several states but occurred in both directions. For all these findings, investigation of other measurements made such as thickness of skinfolds and measurements at ages over 6 years, may further help to explain these differences.

Figure 3a - Percentage of Children Under Six Years of Age With Weights Below 16th and Above 84th Percentiles of Iowa Growth Standards — Ten States and New York City Nutrition Surveys, 1968-1970 (Preliminary)*



*Note: If the Sample data were in agreement with the Iowa Growth Chart, 16% of the sample would be expected below the 16th percentile and 16% expected above the 84th percentile.

Figure 3b - Percentage of Children Under Six Years of Age With Heights One or More Standard Deviations Below and Above Mean of Iowa Growth Standards — Ten States and New York City Nutrition Surveys, 1968-1970 (Preliminary)*



*Note: According to the normal course of distribution of data, 16% of observations fall greater than one standard deviation below the mean, and 16% fall greater than one standard deviation above the mean.

Figure 3c - Percentage of Children Under Six Years of Age With Weights Below 16th Percentile of Iowa Growth Standards by Below and Above Poverty Groups – Ten States and New York City Nutrition Surveys, 1968-1970 (Preliminary)

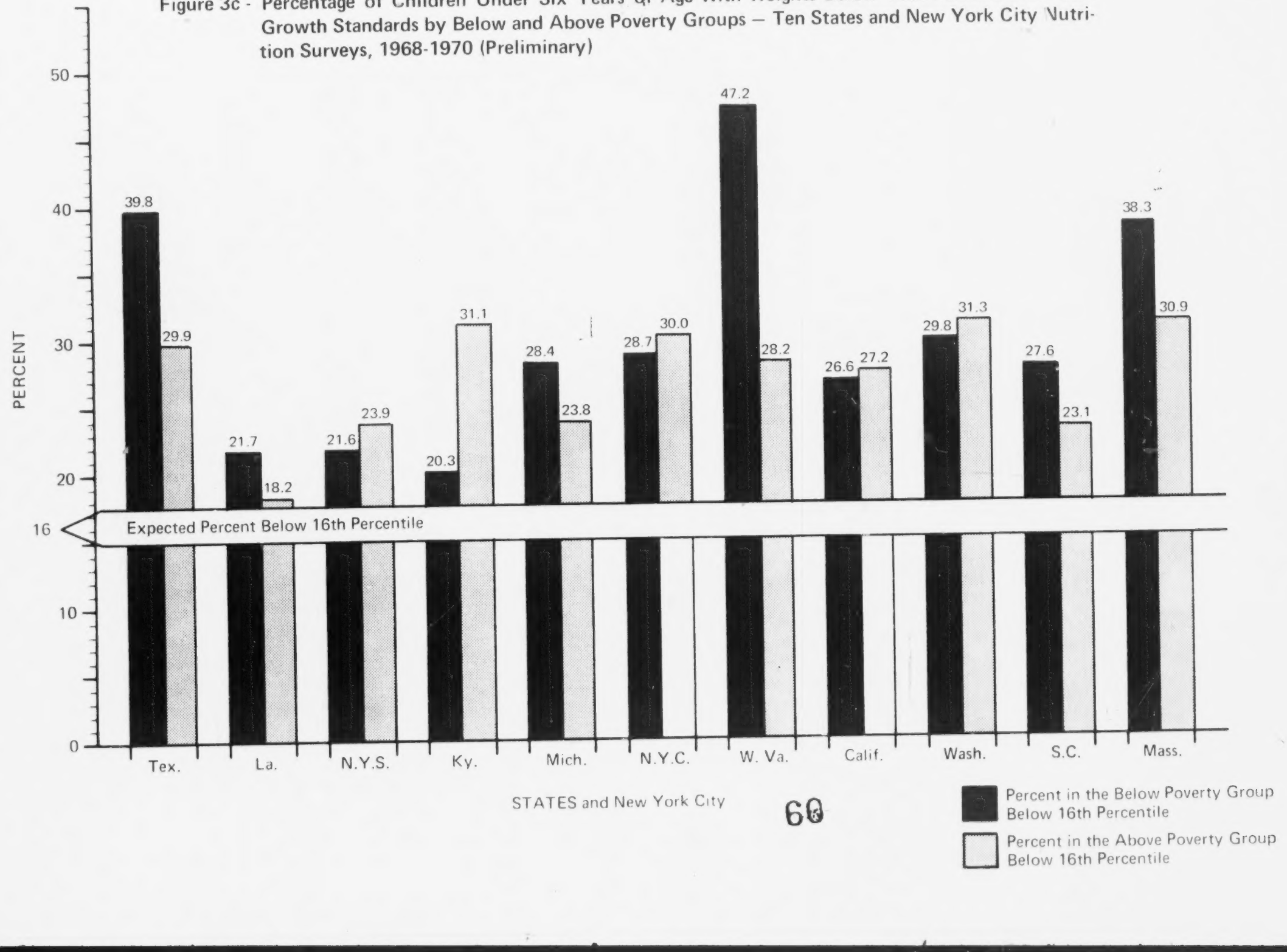


Figure 3d - Percentage of Children Under Six Years of Age With Heights One or More Standard Deviations Below Mean of Iowa Growth Standards by Below and Above Poverty Groups — Ten States and New York City Nutrition Surveys, 1968-1970 (Preliminary)

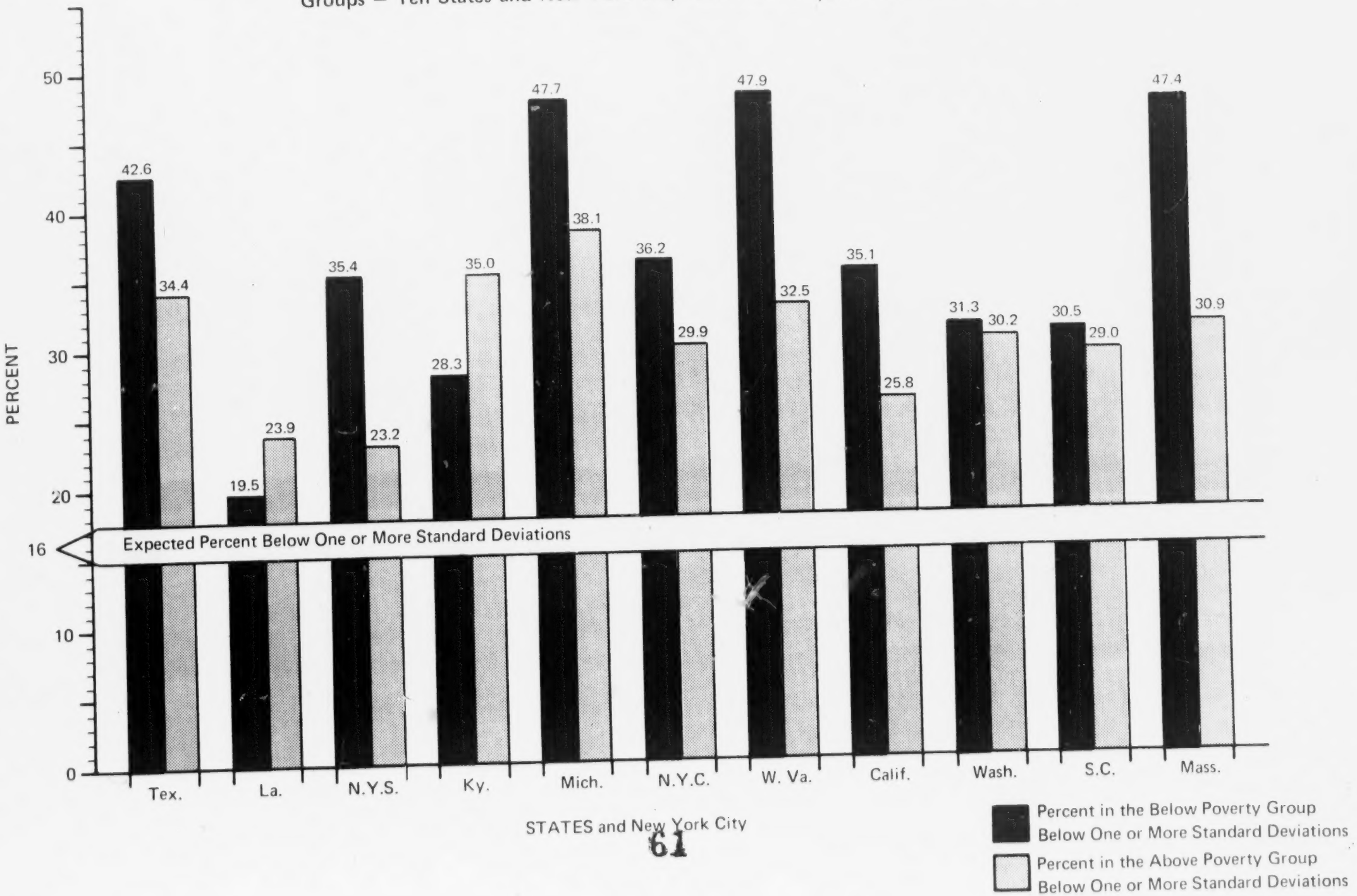


Figure 3e - Percentage of White and Negro Children Under Six Years of Age With Weights Below 16th Percentile of Iowa Growth Standards — Ten States and New York City Nutrition Surveys, 1968-1970 (Preliminary)

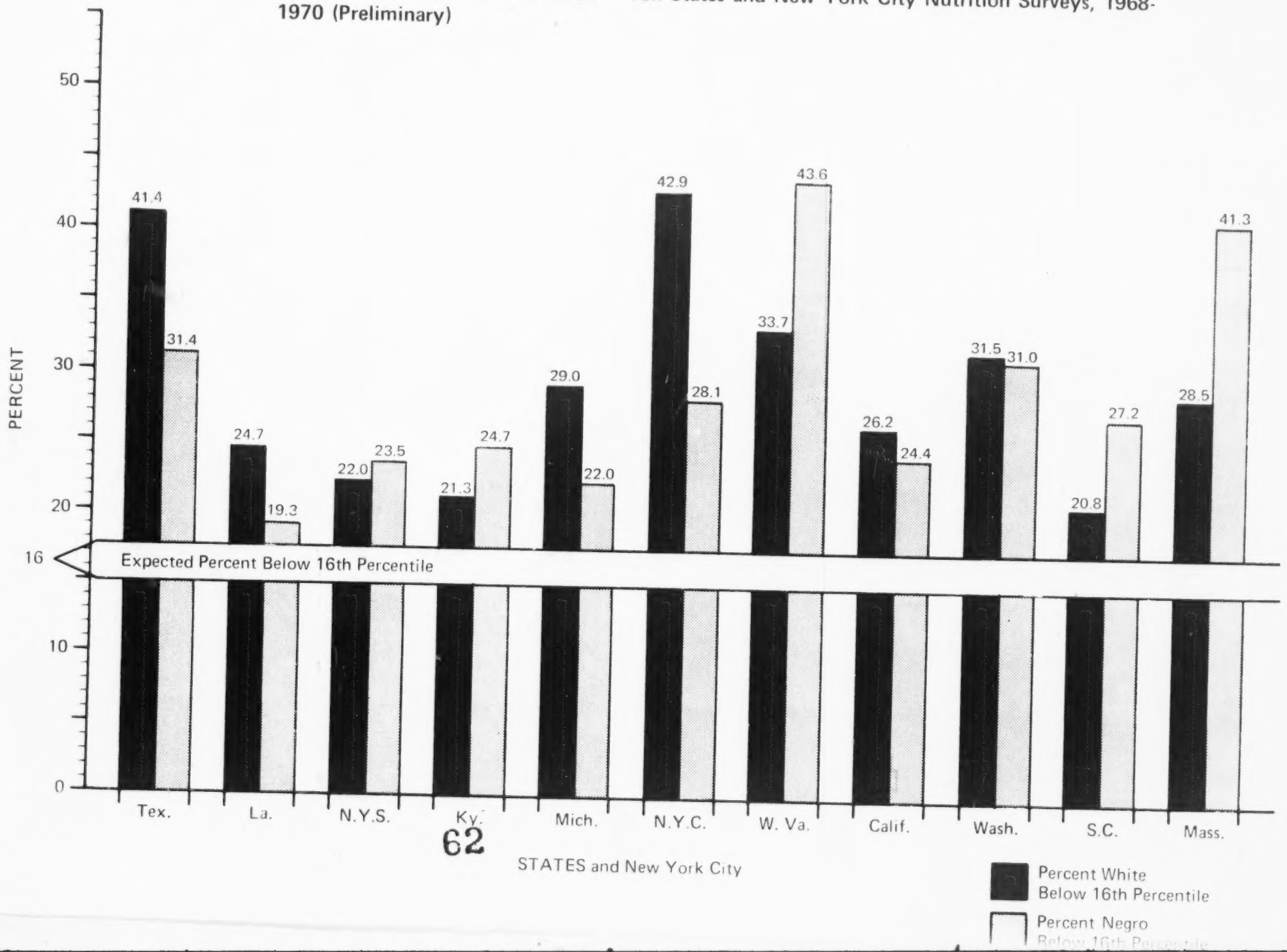
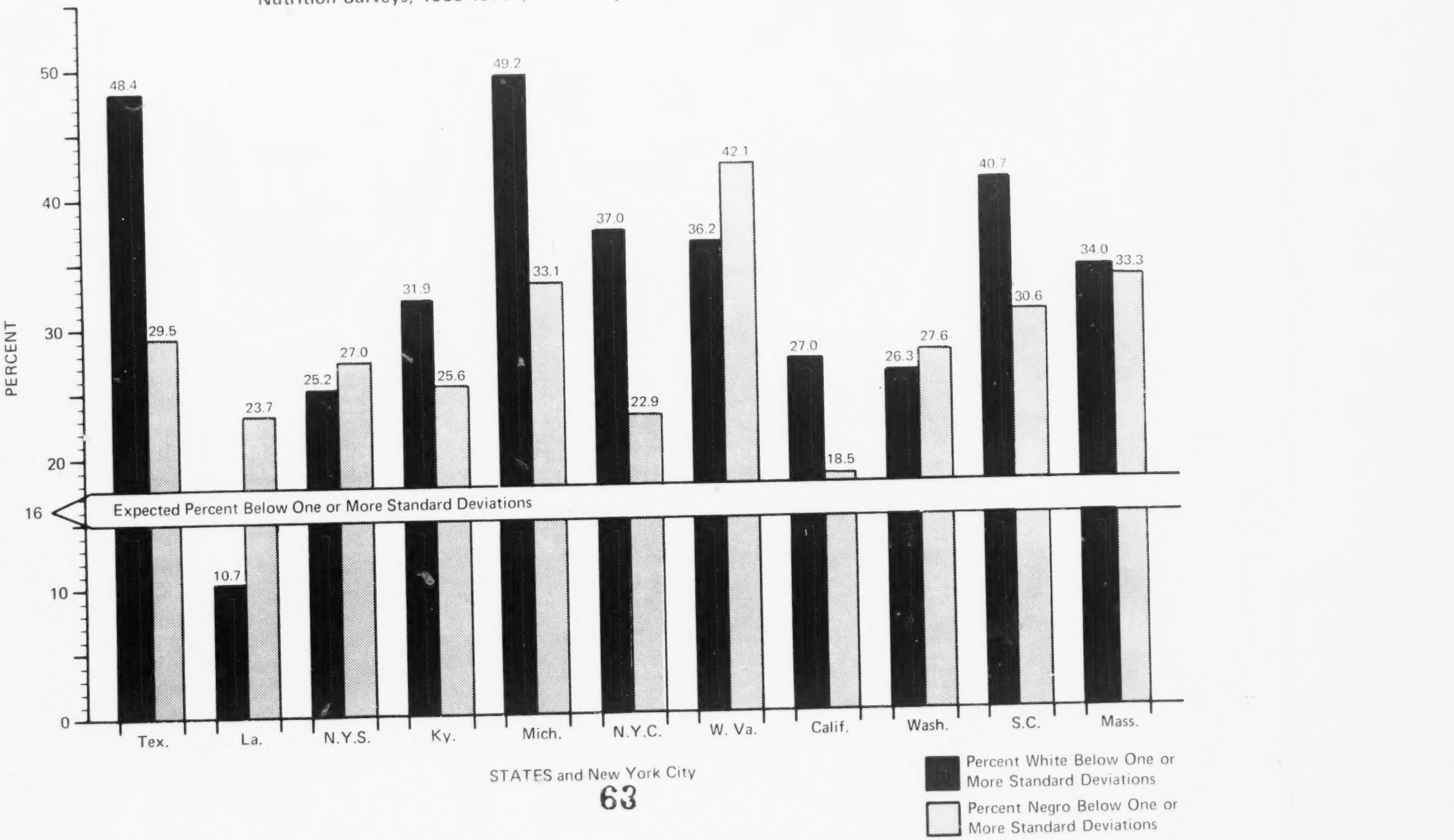


Figure 3f - Percentage of White and Negro Children Under Six Years of Age With Heights One or More Standard Deviations Below Mean of Iowa Growth Standards – Ten States and New York City Nutrition Surveys, 1968-1970 (Preliminary)



V. DIETARY

Dietary intake of selected nutrients as a percentage of reference standards is presented in Tables 13A—13E for groups of individuals living below or above the poverty level. There was no consistent pattern of influence seen between socio-economic status and dietary adequacy.

In most population groups studied, the percentage of individuals having adequate caloric intakes was similar in the below and above poverty groups. Exceptions were among the elderly in Texas and adolescents in Louisiana where potentially inadequate intakes were noted in the below poverty groups. On the other hand, among the elderly in Louisiana and Kentucky and infants in Michigan, the individuals living below poverty had smaller percentages of inadequate intakes than the group living above poverty.

The data suggest little relationship between poverty and adequacy of protein intake.

There appears to be a consistent relationship between dietary iron intake and socio-economic status in all age groups and in all areas. Those individuals living below poverty had greater percentages of inadequate intake than those living above poverty. These data are consistent with previously presented data (Tables 8A and 8B and Figures 1a and 1b), showing a greater relationship between hemoglobin levels and poverty than with the other biochemical measurements and poverty.

The data for vitamin A intake show slight variations between the above and below poverty groups. Trends in a number of groups, such as infants and adolescents, suggest a less adequate intake in the below poverty group.

In all areas studied, the below poverty group had a greater percentage of individuals meeting the standard for adequacy of vitamin C intake than among the above poverty groups. In general these data suggest that there is no major problem with vitamin C intake and support the previous suggestion, based on serum vitamin C data.

The only consistent trends noted in the data as a whole were in infants and adolescents where consistently high percentages of individuals fell below 70 percent of adequacy in regard to iron intake.

PARTICIPATION IN FOOD PROGRAMS

At the time of data collection, only a limited number of counties studied had either commodity foods or food stamps available. Thus the numbers reflected in Table 13F are misleading. The availability of both programs has increased substantially since these data were collected.

The data presented in Table 13F relative to school lunch participation are indicative that not only do substantial numbers of school children attend school where no lunch programs are available, but even when programs are available, participation is limited. These data appear to warrant further investigation into reasons for non-participation.

Table 13A. Summary of Percent of Vulnerable Groups Consuming Specific Levels of Dietary Standards (Adequacy) by Selected Nutrients and Poverty Levels, Texas Nutrition Survey, (Thru E.D. 103) 1968 (Preliminary)

Vulnerable Groups and Percent of Dietary Standard (Adequacy)	Selected Nutrients									
	Calories		Protein		Iron		Vitamin A		Vitamin C	
	Below Poverty	Above Poverty	Below Poverty	Above Poverty	Below Poverty	Above Poverty	Below Poverty	Above Poverty	Below Poverty	Above Poverty
Households—No.	255	166	255	166	255	166	255	166	255	166
Under 50 Pct.	21.6	21.7	10.2	9.0	16.1	12.0	29.0	19.9	23.9	15.1
50 Thru 69 Pct.	22.7	19.3	9.4	9.6	16.5	14.5	14.9	15.1	6.7	8.4
70 Thru 99 Pct.	26.3	28.3	17.6	12.0	25.9	23.5	14.9	12.7	9.4	7.2
100 Pct. & Over	29.4	30.7	62.8	69.4	41.5	50.0	41.2	52.3	60.0	69.3
Infants—No.	56	28	56	28	56	28	56	28	56	28
Under 50 Pct.	19.6	25.0	16.1	14.3	75.0	46.4	28.6	17.9	57.1	32.1
50 Thru 69 Pct.	5.4	7.1	3.6	3.6	5.4	14.3	10.7	3.6	3.6	10.7
70 Thru 99 Pct.	17.9	14.3	—	7.1	12.5	17.9	10.7	7.1	10.7	14.3
100 Pct. & Over	57.1	53.6	80.3	75.0	7.1	21.4	50.0	71.4	28.6	42.9
Adolescents—No.	480	160	480	160	480	160	480	160	480	160
Under 50 Pct.	13.1	13.8	24.8	22.5	60.4	59.3	19.0	15.0	64.6	58.2
50 Thru 69 Pct.	9.6	6.9	26.3	25.0	10.8	9.4	8.3	6.3	2.5	0.6
70 Thru 99 Pct.	14.2	10.6	10.8	10.6	10.0	6.9	7.7	8.1	5.4	5.6
100 Pct. & Over	63.1	68.7	38.1	41.9	18.8	24.4	65.0	70.6	27.5	35.6
Aging—No.	119	71	119	71	119	71	119	71	119	71
Under 50 Pct.	34.5	32.4	23.5	23.9	15.1	12.7	34.5	32.4	22.7	26.8
50 Thru 69 Pct.	25.2	14.1	20.2	9.9	18.5	19.7	10.9	9.9	6.7	5.6
70 Thru 99 Pct.	19.3	22.5	23.5	12.7	21.0	16.9	10.9	8.5	10.1	11.3
100 Pct. & Over	21.0	31.0	32.8	53.5	45.4	50.7	43.7	49.2	60.5	56.3

NOTE: Unknowns are excluded.

Table 13B. Summary of Percent of Vulnerable Groups Consuming Specific Levels of Dietary Standards (Adequacy) by Selected Nutrients and Poverty Levels, Louisiana Nutrition Survey, 1968-69 (Preliminary)

Vulnerable Groups and Percent of Dietary Standard (Adequacy)	Selected Nutrients									
	Calories		Protein		Iron		Vitamin A		Vitamin C	
	Below Poverty	Above Poverty	Below Poverty	Above Poverty	Below Poverty	Above Poverty	Below Poverty	Above Poverty	Below Poverty	Above Poverty
Households—No.	75	93	75	93	75	93	75	93	75	93
Under 50 Pct.	30.7	21.5	9.3	8.6	24.0	20.4	34.7	24.7	26.7	19.4
50 Thru 69 Pct.	21.3	19.4	12.0	8.6	17.3	20.4	13.3	20.4	8.0	9.7
70 Thru 99 Pct.	25.3	24.7	18.7	19.4	25.3	22.6	16.0	16.1	6.7	11.8
100 Pct. & Over	22.7	34.4	60.0	63.4	33.4	36.6	36.0	38.8	58.6	59.1
Infants—No.	82	43	82	43	82	43	82	43	82	43
Under 50 Pct.	14.6	16.3	9.8	9.3	56.0	60.4	17.1	23.3	45.1	46.6
50 Thru 69 Pct.	13.4	14.0	—	4.7	22.0	4.7	11.0	7.0	11.0	2.3
70 Thru 99 Pct.	25.6	23.3	3.7	2.3	6.1	4.7	14.6	20.9	12.2	11.6
100 Pct. & Over	46.4	46.4	86.5	83.7	15.9	30.2	57.3	48.8	31.7	39.5
Adolescents—No.	125	83	125	83	125	83	125	83	125	83
Under 50 Pct.	28.8	20.5	11.2	6.0	60.0	37.3	42.4	36.1	39.2	32.5
50 Thru 69 Pct.	28.8	25.3	12.0	14.5	17.6	22.9	14.4	14.5	10.4	12.0
70 Thru 99 Pct.	28.0	28.9	17.6	15.7	16.0	19.3	16.8	16.9	10.4	9.6
100 Pct. & Over	14.4	25.3	59.2	63.8	6.4	20.5	26.4	32.5	40.0	45.9
Aging—No.	22	18	22	18	22	18	22	18	22	18
Under 50 Pct.	40.9	27.8	40.9	—	45.5	5.6	50.0	33.3	45.5	33.3
50 Thru 69 Pct.	27.3	33.3	18.2	22.2	4.5	16.7	—	22.3	4.5	5.6
70 Thru 99 Pct.	13.6	33.3	9.1	38.9	22.7	16.7	13.6	11.1	—	—
100 Pct. & Over	18.2	5.6	31.8	38.9	27.3	61.0	36.4	33.3	50.0	61.1

NOTE: Unknowns are excluded.

Table 13C. Summary of Percent of Vulnerable Groups Consuming Specific Levels of Dietary Standards (Adequacy) by Selected Nutrients and Poverty Levels, New York State Nutrition Survey, 1969 (Preliminary)

Vulnerable Groups and Percent of Dietary Standard (Adequacy)	Selected Nutrients									
	Calories		Protein		Iron		Vitamin A		Vitamin C	
	Below Poverty	Above Poverty	Below Poverty	Above Poverty	Below Poverty	Above Poverty	Below Poverty	Above Poverty	Below Poverty	Above Poverty
Households—No.	62	377	62	377	62	377	62	377	62	377
Under 50 Pct.	12.9	9.3	11.3	2.7	16.1	9.8	12.9	10.9	14.5	8.0
50 Thru 69 Pct.	19.3	18.0	9.7	8.8	19.4	15.9	16.1	13.0	4.8	4.8
70 Thru 99 Pct.	33.9	30.8	16.1	15.4	29.0	26.3	16.1	17.8	8.1	6.4
100 Pct. & Over	33.9	41.9	62.9	73.1	35.5	48.0	54.9	58.3	72.6	80.8
Infants—No.	19	63	19	63	19	63	19	63	19	63
Under 50 Pct.	15.8	9.5	5.3	6.3	68.4	50.9	15.8	11.1	21.1	20.6
50 Thru 69 Pct.	15.8	6.3	5.3	—	10.5	19.0	21.1	11.1	10.5	14.3
70 Thru 99 Pct.	5.3	20.6	10.5	3.2	15.8	7.9	15.8	11.1	15.8	12.7
100 Pct. & Over	63.1	63.6	78.9	90.5	5.3	22.2	47.3	66.7	52.6	52.4
Adolescents—No.	70	293	70	293	70	293	70	293	70	293
Under 50 Pct.	14.3	12.6	1.4	2.7	24.3	27.0	18.6	9.9	20.0	10.6
50 Thru 69 Pct.	21.4	18.1	2.9	4.8	18.6	24.6	11.4	13.7	14.3	6.8
70 Thru 99 Pct.	30.0	33.8	7.1	11.9	22.9	19.8	21.4	18.8	2.9	7.2
100 Pct. & Over	34.3	35.5	88.6	80.6	34.2	28.6	48.6	57.6	62.8	75.4
Aging—No.	41	118	41	118	41	118	41	118	41	118
Under 50 Pct.	22.0	16.9	22.0	10.2	14.6	5.9	34.1	22.9	29.3	18.6
50 Thru 69 Pct.	22.0	22.0	7.3	17.8	19.5	12.7	17.1	11.9	4.9	5.9
70 Thru 99 Pct.	26.8	28.0	29.3	21.2	24.4	28.0	9.8	18.6	7.3	12.7
100 Pct. & Over	29.2	33.1	41.4	50.8	41.5	53.4	39.0	46.6	58.5	62.8

NOTE: Unknowns are excluded.

Table 13D. Summary of Percent of Vulnerable Groups Consuming Specific Levels of Dietary Standards (Adequacy) by Selected Nutrients and Poverty Levels, Kentucky Nutrition Survey, 1969 (Preliminary)

Vulnerable Groups and Percent of Dietary Standard (Adequacy)	Selected Nutrients									
	Calories		Protein		Iron		Vitamin A		Vitamin C	
	Below Poverty	Above Poverty	Below Poverty	Above Poverty	Below Poverty	Above Poverty	Below Poverty	Above Poverty	Below Poverty	Above Poverty
Households—No.	119	101	119	101	119	101	119	101	119	101
Under 50 Pct.	16.8	7.9	10.1	5.0	10.9	6.9	26.1	13.9	21.0	11.9
50 Thru 69 Pct.	18.5	12.9	7.6	7.9	20.1	18.8	19.3	16.8	10.1	5.9
70 Thru 99 Pct.	30.3	37.6	22.7	11.9	34.5	30.7	13.4	13.9	10.1	10.9
100 Pct. & Over	34.4	41.6	59.6	75.2	34.5	43.6	41.2	55.4	58.8	71.3
Infants—No.	30	12	30	12	30	12	30	12	30	12
Under 50 Pct.	16.7	16.7	10.0	8.3	70.0	41.7	23.3	8.3	40.0	25.0
50 Thru 69 Pct.	10.0	—	3.3	—	20.0	33.3	6.7	25.0	16.7	8.3
70 Thru 99 Pct.	10.0	16.7	6.7	—	3.3	8.3	20.0	8.3	20.0	8.3
100 Pct. & Over	63.3	66.6	80.0	91.7	6.7	16.7	50.0	58.4	23.3	58.4
Adolescents—No.	101	69	101	69	101	69	101	69	101	69
Under 50 Pct.	25.7	17.4	12.9	7.2	39.7	33.4	29.7	23.2	21.8	15.9
50 Thru 69 Pct.	20.8	26.1	9.9	5.8	25.7	27.5	10.9	14.5	5.0	11.6
70 Thru 99 Pct.	23.8	23.2	17.8	17.4	17.8	15.9	11.9	24.6	20.8	10.1
100 Pct. & Over	29.7	33.3	59.4	69.6	16.8	23.2	47.5	37.7	52.4	62.4
Aging—No.	52	27	52	27	52	27	52	27	52	27
Under 50 Pct.	11.5	29.6	7.7	7.4	5.8	18.5	34.6	18.5	36.5	29.6
50 Thru 69 Pct.	26.9	14.8	19.2	22.2	15.4	7.4	15.4	14.8	7.7	14.8
70 Thru 99 Pct.	23.1	40.8	26.9	37.1	32.7	33.3	19.2	7.4	11.5	14.8
100 Pct. & Over	38.5	14.8	46.2	33.3	46.1	40.8	30.8	59.3	44.3	40.8

NOTE: Unknowns are excluded.

Table 13E. Summary of Percent of Vulnerable Groups Consuming Specific Levels of Dietary Standards (Adequacy) by Selected Nutrients and Poverty Levels, Michigan Nutrition Survey, 1969 (Preliminary)

Vulnerable Groups and Percent of Dietary Standard (Adequacy)	Selected Nutrients									
	Calories		Protein		Iron		Vitamin A		Vitamin C	
	Below Poverty	Above Poverty	Below Poverty	Above Poverty	Below Poverty	Above Poverty	Below Poverty	Above Poverty	Below Poverty	Above Poverty
Households—No.	102	187	102	187	102	187	102	187	102	186
Under 50 Pct.	17.6	10.2	5.9	5.3	12.7	8.6	22.5	13.9	23.5	9.7
50 Thru 69 Pct.	14.7	18.7	6.9	4.3	15.7	13.9	16.7	13.9	6.9	3.8
70 Thru 99 Pct.	26.5	24.1	19.6	17.1	24.5	33.7	17.6	25.1	10.8	8.6
100 Pct. & Over	41.2	47.0	67.6	73.2	47.1	43.8	43.2	47.1	58.8	77.9
Infants—No.	43	62	43	62	43	62	43	62	43	62
Under 50 Pct.	4.7	11.3	2.3	11.3	46.5	64.5	18.6	17.7	41.9	33.9
50 Thru 69 Pct.	4.7	6.5	2.3	—	20.9	17.7	11.6	6.5	9.2	9.7
70 Thru 99 Pct.	20.9	27.4	2.3	1.6	25.6	6.5	20.9	17.7	7.0	9.7
100 Pct. & Over	69.7	54.8	93.1	87.1	7.0	11.3	48.9	58.1	41.9	46.7
Adolescents—No.	135	236	135	236	135	236	135	236	135	236
Under 50 Pct.	22.2	14.4	4.4	3.0	25.2	24.6	36.3	24.6	28.9	19.5
50 Thru 69 Pct.	21.5	16.9	7.4	2.5	25.9	25.8	12.6	11.9	7.4	5.5
70 Thru 99 Pct.	23.0	30.9	18.5	14.4	20.7	24.2	11.1	19.5	9.6	7.6
100 Pct. & Over	33.3	37.8	69.7	80.1	28.2	25.4	40.0	44.0	54.1	67.4
Aging—No.	35	76	35	76	35	76	35	76	35	76
Under 50 Pct.	17.1	19.7	11.4	10.5	20.0	5.3	40.0	35.5	37.1	22.4
50 Thru 69 Pct.	28.6	23.7	22.9	15.8	8.6	11.8	8.6	17.1	5.7	9.2
70 Thru 99 Pct.	22.9	25.0	17.1	26.3	14.3	23.7	17.1	13.2	11.4	6.6
100 Pct. & Over	31.4	31.6	48.6	47.4	57.1	59.2	34.3	34.2	45.8	61.8

NOTE: Unknowns are excluded.

Table 13F. Participation of Households Using Commodities and Buying Food Stamps and Adolescents in School Lunch Programs in Eight States and New York City Nutrition Surveys, 1969-1970 (Preliminary)

	Total	N.Y. State	Ky.	Mich.	N.Y. City	W. Va.	Calif.	Wash.	S.C.	Mass.
Total Houscholds	**25505**	**2868**	**1592**	**1672**	**1381**	**1800**	**5750**	**4364**	**3118**	**2960**
Total Households Attending Clinic	10521	1125	594	777	681	588	2069	2043	1120	1524
Households Selected for HH Dietary Interview	5122	542	277	350	307	370	1262	921	452	641
Using Commodities	250	38	9	16	74	2	34	0	5	72
Buying Food Stamps	467	13	46	17	0	53	94	126	117	1
Households with Adolescents Selected for Dietary Interview	3075	286	170	247	186	175	552	495	527	437
Households with Adolescents Attending Schools with School Lunch Program	2659	242	148	208	171	148	488	430	523	301
Total No. of Adolescents Interviewed (Dietary)	5387	446	262	436	345	297	989	906	938	768
No. of Adolescents Attending School w/School Lunch Program	4349	358	225	343	279	238	806	710	920	470
No. of Adolescents Participating in School Lunch Program	3016	210	187	211	186	176	477	447	790	332
% with school lunch available	81	80	86	79	81	80	81	78	98	61
% participating where available	69	59	83	62	67	74	59	63	86	71

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